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SAFEGUARDING THE ATOM: NUCLEAR ENERGY AND NONPROLIFERATION CHALLENGES

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SAFEGUARDING THE ATOM: NUCLEAR ENERGY AND NONPROLIFERATION CHALLENGES

TUESDAY, JULY 31, 2007

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
Washington, DC.

The committee met, pursuant to notice, at 9:34 a.m., in room SD–419, Dirksen Senate Office Building, Hon. Robert P. Casey, Jr., presiding.

Present: Senators Casey and Lugar.

OPENING STATEMENT OF HON. ROBERT P. CASEY, JR., U.S. SENATOR FROM PENNSYLVANIA

Senator CASEY. This hearing shall come to order.

Today, the Foreign Relations Committee will examine policy options that can help strengthen the nuclear nonproliferation regime and prevent the nightmare scenario of a nuclear weapon exploding in an American city. To the extent that states like North Korea and Iran succeed in acquiring nuclear weapons, and unstable regimes like Pakistan continue to expand existing nuclear arsenals, that threat will continue to grow. For this reason, we must renew our efforts to reinforce the nuclear nonproliferation regime and prevent additional states from acquiring the deadliest weapons known to humanity.

I want to thank Chairman Biden for graciously offering to me this opportunity to chair today's hearing in his absence. And I know that nuclear nonproliferation is an issue to which he has dedicated much time and energy over his distinguished career in the United States Senate. The chairman has prepared a formal statement, which I ask be entered into the record.

Senator CASEY. Many years ago, back in 1963, President Kennedy predicted a world where 15 to 20 states would acquire nuclear weapons. President Kennedy's frightening vision has not come to pass, and, for that, we largely have the nuclear nonproliferation regime to thank. This regime, embodied by the Nuclear Non-Proliferation Treaty which entered into force in 1970, has done a remarkable job in limiting the spread of nuclear weapons. Beyond the original five nuclear-weapon states recognized by the NPT, only four additional states are known to have developed and tested nuclear weapons during the intervening 37 years. This is not a perfect record, but, given the fears of President Kennedy at that time, it speaks to the durability and effectiveness of the NPT.

However, the nonproliferation regime today faces a set of grave challenges that call its future into question. Iran's pursuit of a nuclear program, carried out in secrecy over the past two decades and maintained today in defiance of United Nations resolutions, represents the most serious test.

Iran claims that it is pursuing a nuclear program for exclusively peaceful purposes, in order to establish a source of civilian nuclear power. Iran cites article IV of the treaty to defend its civilian program, contending that this article protects the, "inalienable right" of Iran to pursue a civilian nuclear program. Nonetheless, the very expertise and technology Iran requires to develop a civilian nuclear program, including a complete nuclear fuel cycle, is what it would need to produce fissile material for nuclear weapons. Iran, or some other state in the future, can accrue all of the benefits of the treaty membership while assembling the building blocks of a nuclear weapons program. If Iran succeeds in acquiring a nuclear weapon through the guise of a civilian program, it will set a dangerous example for others to follow.

For that reason, nonproliferation experts are taking a fresh look at the concept of assured fuel supply mechanisms. A commercial nuclear program, by itself, does not give a state the means to develop the fissile material necessary for a nuclear weapon. Rather, what is of concern is the construction of uranium enrichment and plutonium reprocessing facilities, the so-called fuel cycle, to generate nuclear fuel power and nuclear fuel to power nuclear reactors. If we can conceive an approach that allows states to acquire nuclear fuel at prevailing market prices from trusted and reliable sources, they would no longer need to build and maintain costly fuel cycle facilities, the same facilities that can serve as the basis for a weapons program. A nonnuclear-weapons state that insisted on doing so would immediately raise suspicions over its real intentions, and give warning to the international community, at the same time Iran experienced—at the same time the Iran experience demonstrates to all of us the sustained value of rigorous international safeguards in deterring and detecting illicit nuclear weapons programs.

What we know today about Iran's nuclear program is largely due to the diligent and painstaking work of the International Atomic Energy Agency undertaken since 2002. The IAEA has gained access to Iranian facilities, interviewed Iranian officials, and published detailed reports on the progress and scope of Iran's uranium enrichment efforts, providing the international community with an invaluable perspective on Iran's program. Nonetheless, the IAEA budget and staff are under great pressure, as it needs to keep pace with a growing number of civilian nuclear facilities worldwide.

The ranking member on this committee, Senator Lugar, along with Senator Bayh, working in a bipartisan manner, have introduced legislation to give the President authority to establish bilateral and multilateral fuel supply mechanisms and authorize appropriations to fortify the capability of the International Atomic Energy Agency to implement nuclear safeguards. Their bill is a promising one, and I look forward, today, to learning more about it.

The nuclear nonproliferation regime today is in trouble, not only due to the challenges I've outlined above, but also, frankly, due to the wrongheaded policies of the Bush administration. Beginning with its unilateral withdrawal from the ABM Treaty in 2001, the administration has shown a blatant disregard for the diplomacy and multilateral cooperation so essential to a strong nonproliferation regime.

In my opinion, the United States missed a golden opportunity in 2005 to use the NPT Review Conference as a forum to begin a serious dialog with other nations on how we can revitalize the regime to address the new challenges posed by Iran and others.

The administration has not helped matters by explicitly adopting a double standard when it comes to nuclear-weapon states, encouraging and assisting those we deem our friends at the same time we are condemning others.

Finally, by focusing excessively on regime change instead of change in behavior, the United States stood by as North Korea quadrupled—quadrupled—the size of its fissile material stockpile and tested a nuclear weapon, only coming to the belated recognition that diplomacy was the only solution with a chance of working.

Today, we'll hear from a distinguished and extremely knowledgeable group of witnesses. Senator Bayh will first address the committee to discuss the reasoning behind the legislation that he and the ranking member, Senator Lugar, have introduced to give a jump start to assure fuel supply mechanisms and strengthened nuclear safeguards. The committee welcomes Senator Bayh, and we look forward to his remarks.

And then, after Senator Bayh, we'll hear from the executive branch. Dr. Andrew Semmel, the Acting Deputy Assistant Secretary of State for Nuclear Nonproliferation Policy and Negotiations, will provide the administration's perspective on how the United States can further strengthen the nuclear nonproliferation regime and the role that fuel supply mechanisms and enhanced safeguards can play in that process. He has served in the State Department since 2003, and I understand that Dr. Semmel is no stranger to the committee. From 1985 to 2001, he served as a senior staffer to Senator Lugar for foreign policy issues. So, we welcome him today.

Our final panel will include three experts on nuclear nonproliferation, who have all served in various capacities in the U.S. Government, but now serve in private capacities. I'll introduce these three witnesses when we come to that panel, and I'll look forward to their seasoned perspectives.

And, with that, I'll turn the microphone over to the ranking member, Senator Lugar.

OPENING STATEMENT OF HON. RICHARD G. LUGAR, U.S. SENATOR FROM INDIANA

Senator LUGAR. Well, thank you very much, Senator Casey, for chairing this hearing. And I join you in welcoming my friend and Hoosier colleague and my partner in this endeavor, Senator Evan Bayh, who has provided very important leadership on the issues we will examine today.

The international nuclear nonproliferation regime has suffered significant setbacks in recent years, and it's vital that the United States assign a high diplomatic priority to strengthening that regime. The Nuclear Non-Proliferation Treaty, the NPT, and the International Atomic Energy Agency, the IAEA, have succeeded in forestalling nuclear weapons programs in most of the world's advanced industrial states, but the IAEA is hard-pressed to keep pace with the global expansion of nuclear weapons technology, especially uranium enrichment and spent nuclear fuel processing, both of which can produce fissile material for weapons.

The construction of facilities for the enrichment of uranium and reprocessing of spent nuclear fuel in new states, even for ostensibly peaceful purposes, poses an unacceptable risk to the international nonproliferation regime. This risk arises because enrichment and reprocessing technology intended to produce fuel for civilian reactors can also be used to create weapons material. The spread of these capabilities would dangerously increase the chances that new nations could develop nuclear weapons and that terrorists could obtain nuclear materials for bombs.

The threat posed by the spread of nuclear fuel cycle technology has been complicated by the growing attractiveness of nuclear power, both in developed and developing countries. As energy costs soar and concerns about global warming deepen, many states are considering investing in nuclear power as a way to expand their capacity to generate electricity. The United States must help shape a response to this dilemma. We should be making clear that there is no technology or economic reason why the expansion of civilian nuclear power must be accompanied by the construction of enrichment or reprocessing facilities.

Senator Bayh and I have proposed that the United States and like-minded nations should establish a new international system whereby countries that give up their enrichment and reprocessing programs will be rewarded with a guaranteed supply of reasonably priced fuel for nuclear power generation.

Before the July 4th recess, the Committee on Foreign Relations unanimously approved Senate bill 1138, legislation that I offered with Senator Bayh. The Lugar-Bayh bill embraces both bilateral and multilateral fuel supply mechanisms and calls for a report on the establishment of an international nuclear fuel authority. Our bill makes it the policy of the United States to discourage the development of enrichment and reprocessing capabilities in additional countries, to encourage the creation of bilateral and multilateral assurances of nuclear fuel supply, and to ensure that all supply mechanisms operate in strict accordance with the IAEA safeguard system.

Our bill also specifies that this policy must not result in any additional unmet verification burdens for the system. This point is important, because, even as the world demand for civilian nuclear power grows, the IAEA, charged with ensuring that nuclear energy programs are not used for weapons development, operates on a shoestring budget, with old equipment. This situation threatens the institution and the nuclear stability that the IAEA supports.

Last November, I visited the IAEA and its Safeguards Analytical Laboratory, located just outside Vienna, Austria. Nuclear samples

from around the world are collected by IAEA inspectors and brought to this laboratory. There, they are tested to determine if nations are complying with their obligations under the NPT.

The laboratory is on the front lines in the struggle to prevent states from pursuing undeclared nuclear weapons research and development. Unfortunately, the laboratory's aging equipment and dangerous working conditions hamper the important work that is done there. In addition, the IAEA technicians are severely limited in the time they can spend analyzing evidence in the so-called "hot," or nuclear, part of the laboratory, because it is served by a dilapidated air-purification system. The laboratory will become increasingly stressed as more states expand their nuclear power infrastructures.

The Lugar-Bayh bill calls for the refurbishment or possible replacement of the IAEA Safeguards Analytical Laboratory. The IAEA is performing an absolutely indispensable security function for the global community. The scientists working there must have the state-of-the-art equipment necessary to do their jobs.

Fixing those problems will require global cooperation, but the first step in this process is American leadership. We must lead an international effort to ensure that the IAEA has the resources and capabilities it needs to effectively conduct its critical safeguards mission and to respond to the coming expansion of nuclear power.

I thank you, again, Mr. Chairman, for allowing me to make this statement. I look forward to engaging in discussion with all of our witnesses.

Senator CASEY. Thank you, Senator. And I'm honored to be here with you, after all the work you've done on these issues over many years.

And to make sure this is almost a 100-percent Hoosier hearing, we now have the honor to have Senator Bayh make his statement.

And, Senator, we're honored to have you, and the floor is yours.

STATEMENT OF HON. EVAN BAYH, U.S. SENATOR FROM INDIANA

Senator BAYH. Thank you, Senator Casey. I'm sure that Dick would be pleased to join with me in adopting you as an honorary Hoosier, so we could make this a 100-percent Hoosier undertaking here today.

Senator CASEY. Thank you.

Senator BAYH. At least we're all part of the great Midwest. So, it's—thank you for chairing the hearing today, Senator Casey. It's been a pleasure, now, serving you within the Senate—in the Senate. And, as we've discussed before, I can't help but think of your father whenever we're together. I had the privilege of serving with him for 6 years as Governor, and I don't know why, but I'm always happy to see sons following fathers into public service. So, it's a pleasure to be with you here today.

Please give my regards and thanks to Chairman Biden. I know how busy he is these days. As Senator Lugar mentioned, we're grateful that he brought our legislation before the committee, and that it was passed unanimously. We're also grateful that he's afforded us this forum here today, so I hope you'll please convey my thanks to him.

And, Senator Lugar, it's a privilege to be with you again, working on this matter. I think, as everyone in the room knows, my colleague and friend is a globally recognized expert in this area. It may not always be the most glamorous of issues, but it's vitally important to the future of our country, and I am privileged to have my name associated with yours here today.

Mr. Chairman, the 21st century has begun with unprecedented global demand for energy. This increase is the result of economic expansion in the United States, in the industrial economies of Europe and Japan, and from emerging countries, like India and China. Given the rapid rates of growth in the developing world, prices for traditional sources of energy are likely to remain high. Supplies of oil, gas, and coal are finite, so countries will be looking elsewhere to secure stable, affordable sources of energy. Nuclear power is an obvious place for them to look.

Environmental factors will reinforce this trend. Energy derived from fossil fuels contributes to global climate change. Electricity generated by nuclear power, on the other hand, does not produce pollutants like sulfur or mercury, or greenhouse gases like carbon dioxide. While alternative energy sources, like wind, solar, and geothermal power, show great promise, it is unlikely that they will be sufficient to satisfy expanding global electricity needs in the near term. For example, total world energy demand is expected to double by the year 2050, so there would be—so there will be both strong economic and environmental incentives for countries to examine the nuclear option.

Increased use of nuclear power will mean new nuclear facilities and material in the possession of many new states over the coming decades, exponentially raising the risk that fissile material could be acquired by rogue nations or terrorist groups. According to our latest public intelligence assessments, terrorist organizations continue to pursue the acquisition of a nuclear device, and would not hesitate to use it. We must ensure that the International Atomic Energy Agency has the necessary resources and technology to cope with this expansion of civilian nuclear power and to safeguard against dangerous proliferation.

We must also ensure that this increased demand for civilian nuclear energy does not become a subterfuge for rogue nations seeking to acquire a nuclear military capability. Regrettably, that is precisely what is happening today in Iran.

Because Iran claims to be enriching uranium for civilian uses, the current global regulatory structure allows Tehran to walk right up to the threshold of developing a nuclear bomb. This is dangerously naive. North Korea pursued precisely the same tactic to realize its nuclear ambitions, and we are perilously close to seeing history repeat itself, only this time with a nation actively supporting terrorist groups and deeply hostile to the United States.

Once this genie gets out of the bottle, there is no putting it back. At a minimum, allowing Iran to obtain a nuclear warhead would be a regionally destabilizing event certain to spark a Middle East arms race. At worst, it would be a global security catastrophe in which Tehran obtains the means to blackmail its European neighbors and to threaten Israel's destruction.

This gaping loophole in the Nuclear Non-Proliferation Treaty must be closed. The Lugar-Bayh Nuclear Safeguards and Supply Act of 2007 begins to do just that. The Lugar-Bayh Act, as you noted, passed out of this committee unanimously last month, and it makes it the official policy of the United States to discourage the development of enrichment and reprocessing capabilities. It also requires the President to begin exploring the creation of an international nuclear fuel bank.

Our legislation would authorize the President to negotiate both bilateral and multilateral mechanisms to assure that nations seeking civilian nuclear power have a reliable and affordable supply of nuclear fuel for peaceful purposes. In return, countries must agree to forgo enriching uranium themselves, and submit to rigorous IAEA inspections for their civilian reactors to guard against North Korean and Iranian-style cheating.

This approach makes both economic and national security sense. We've learned a lot about the economics of nuclear power since the Non-Proliferation Treaty was negotiated, more than three decades ago. Enrichment is expensive, as is the disposal of nuclear waste. It is not economical for nations desiring civilian nuclear power to enrich their own fuel. There is an enormous surplus of uranium currently in existing enrichment facilities worldwide. And, due to bigger economies of scale, it is now much cheaper for countries lacking enrichment capability to purchase fuel from a central repository than it is to enrich or reprocess it themselves. An international fuel bank would provide affordable nuclear fuel to countries genuinely interested in pursuing civilian nuclear power. It would allow countries to draw fuel for use in their own civilian nuclear reactors, and then return the spent fuel for safe oversight by the IAEA.

The approach advocated by Senator Lugar and I would reduce the potential for proliferation of fissile materials and reduce the prospect of nuclear weapons falling into the hands of the world's most dangerous people.

Of equal importance, our approach would cut short the debate over nuclear technology rights. Every nation would have access to civilian nuclear power, so long as they are willing to abide by conditions that protect global security. Countries that refuse fuel bank services would come under immediate suspicion about their weapons intentions. For example, as you noted, Mr. Chairman, Iran currently contends that it is pursuing a civilian nuclear program to reduce its domestic oil consumption, thereby conserving its reserves for sale on the global market. If true, surely Iran would leap at the opportunity for a more affordable supply of nuclear fuel. Fuel bank services would provide Iran with a faster and cheaper path toward achieving their stated objective of a purely civilian nuclear program. Of course, if the pursuit of civilian nuclear power is a disingenuous pretext, something which many, including I, strongly suspect, that Tehran's true ambitions will be revealed, making it easier to rally world opinion for more aggressive action before it's too late.

Our proposal for a civilian nuclear fuel bank minimizes the risk of inadvertent proliferation, maximizes the prospects for exposing

subterfuges for intentional proliferation, and will help forge consensus for more rigorous steps, should they prove necessary.

Finally, the Lugar-Bayh legislation strengthens the International Atomic Energy Agency's safeguard system, as Senator Lugar was pointing out. The IAEA labs that examine nuclear samples collected by the international inspectors are horribly outdated. Their nuclear scientists are working with 1970s equipment amid dangerous working conditions. I was shocked to learn from Senator Lugar that the IAEA laboratory staff is actually limited in the time they can spend analyzing evidence in the nuclear area of the lab because of a dilapidated air-purification system.

Our legislation makes critical—it makes a critical investment to see that this laboratory is refurbished. As more countries expand their nuclear power infrastructure, the IAEA laboratory will be responsible for inspecting a growing number of samples. They need first-rate facilities and modern equipment to carry out their critical work. If the cop on the beat doesn't have the tools to patrol the streets, then no one in the world's nuclear neighborhood will be safe.

In conclusion, too often in Congress we wait for crises to develop before taking action. In a prenuclear age, perhaps we could get away with this type of reactive posture. But we are living in a different era today. We cannot afford to be complacent when it comes to preventing the spread of nuclear weapons. The consequences of delay or inaction in confronting this threat could have dire consequences for ourselves and for our children.

I urge our colleagues to support this legislation, as this committee unanimously has, and hope we can bring this important legislation to a vote before the entire Senate when we return from our August recess.

And, again, Senator Casey, I want to thank you and Senator Lugar for airing this important subject today.

Thank you.

Senator CASEY. Senator Bayh, thank you very much for your presence here today, your testimony for the work on this bill and all of the issues that pertain to doing everything we can to prevent some of the nightmare scenarios that you and others today have outlined. Thank you very much.

Senator BAYH. Thank you.

Senator CASEY. Next, we'll have Dr. Semmel, if he's available.

Doctor, we want to welcome you to the hearing and to this committee, and we appreciate the work that you've done, here in the Senate and the executive branch, on this critical issue. And we want to give you the time you need to make your statement, and then we'll have some questions.

Thank you.

STATEMENT OF DR. ANDREW SEMMEL, ACTING DEPUTY ASSISTANT SECRETARY FOR NUCLEAR NONPROLIFERATION POLICY AND NEGOTIATIONS, DEPARTMENT OF STATE, WASHINGTON, DC

Dr. SEMMEL. Thank you, Mr. Chairman.

Let me say, first of all, that I will abbreviate my statement somewhat in order to save some time, but I will concentrate on focusing

on the question of the strength of the IAEA to do its mission, and, second, on the nuclear fuel supply issue.

I also should say, at the outset, that, while I'm not a Hoosier, I do know that, as a result of working both on this committee's staff and for Senator Lugar for close to 15 years, I do feel somewhat an honorary Hoosier, nonetheless. And thank you for that introduction.

Senator Casey and Senator Lugar, members of the committee who are not here, thank you for this opportunity to testify at this hearing on safeguarding nuclear energy and nonproliferation challenges.

In his speech at the National Defense University, in February 2004, President Bush highlighted the importance of nuclear nonproliferation for American security in the post-9/11 world. He described how the subjects of this hearing—strengthened IAEA safeguards and assurance of reliable fuel supplies—support our nonproliferation policies. We must, the President stated, ensure that the IAEA has the tools it needs to fulfill its essential mandate. At the same time, he called for the creation of a safe, orderly system to field civilian nuclear plants without adding to the danger of weapons proliferation.

To this end, he proposed that the world's leading nuclear exporters should ensure that states have reliable access at reasonable cost to fuel for civilian reactors, so long as those states renounce enrichment and reprocessing. Enrichment and reprocessing, he said, are not necessary for nations seeking to harness nuclear energy for peaceful purposes.

Since the time of that speech, the promotion of these measures has been an important part of our nonproliferation policies. In this regard, we welcome the bill just discussed by Senator Bayh, the Lugar-Bayh bill, that is the focus of this hearing.

In particular, I would like to call attention, in that legislation, to declaration of new policy, in section 102(b) of that bill, which reads, "It shall be the policy of the United States to discourage the development of enrichment and reprocessing capabilities in additional countries, encourage the creation of bilateral and multilateral assurances of nuclear fuel supply, and ensure that all supply mechanisms operate in strict accordance with the IAEA safeguard system, and do not result in any additional unmet verification burdens for the system."

We're actively pursuing these goals through diplomacy and under existing constitutional and statutory authorities. We have already taken important measures to strengthen the IAEA safeguards and develop reliable fuel supply mechanisms.

Let me focus on IAEA safeguards. As is pointed out in the Lugar-Bayh bill, in S. 1138, the array of challenges facing the IAEA safeguards in recent years is likely to continue and to require more safeguards resources in the future.

First, the IAEA has been conducting prolonged and intensive investigations dealing with noncompliance, which it must undertake with the highest priority. The circumstances in Iran, and now, once again, with the DPRK, are well known to all of us here.

Second, the number and size of declared nuclear activities under safeguards continue to grow. The agency is required, by legally

binding safeguards agreements, to perform these activities. In the short term, the IAEA is being asked to safeguard large new fuel cycle facilities in Japan, and we also expect growth in safeguards activities in new areas, such as India. In the longer term, there is renewed interest worldwide in nuclear energy as an important component of the world's energy supply, and the number and size of nuclear facilities around the world will continue to grow, and likely accelerate.

Third, the recent efforts to strengthen safeguards requires new safeguards activities. As more states bring safeguards agreements and additional protocols into force or adhere to strengthened versions of safeguards agreements, the agency's workload will increase, and does increase.

Fourth, new safeguards activities require efficient, effective, and state-of-the-art technological, methodological information and communications infrastructure in support of its verification regime. Some of this infrastructure is provided for in the agency's regular budget. However, the IAEA must rely upon voluntary contributions from donor states to purchase other equipment and services to carry out its verification function.

To address these challenges, the IAEA relies on funding from its regular budget and voluntary contributions. The United States has consistently been a strong supporter of the IAEA—both the executive branch and the Congress have been of one mind on this and its verification activities, in particular. However, the distribution of the regular budget funding between verification activities and other agency activities is often a source of contention at the IAEA, with many developing countries relentlessly arguing for more resources to be devoted to technical cooperation.

In 2003, a U.S. initiative resulted in an increase in the agency's regular budget, of approximately 20 percent, that was spread out over the last 4 years. This overcame, for the moment at least, the longstanding practice of zero real growth of the agency's regular budget. For 2008 and 2009, the agency requested an 8.5-percent increase in its regular budget. About a quarter of this increase was aimed at safeguards, and half of the remaining amount was for expenses, such as computer systems, that support the agency activities. However, the board of governors reduced this request down to 4.2 percent for 2008 and 2009. This amount totals something like 1.4 percent in real growth in the agency's budget.

Given the constraints in the regular budget, a significant portion of the agency's safeguards budget is derived from voluntary contributions. The United States is, by far, the largest contributor. This year, we're providing $53 million in voluntary contributions, including $21 million for safeguards. The safeguards contribution includes $14 million for the U.S. Program of Technical Assistance to IAEA Safeguards—the acronym is POTAS—and for funding sample analysis and safeguards equipment. There is also, in this amount, $3 million to be used as needed, for the DPRK.

It's likely the agency will face challenges with regard to funding—finding additional and adequate resources in the future. The IAEA director general noted, in his June statement at the board of governors, that he believes that, and I quote, "The agency remains underfunded in many critical areas, a situation which, if it remains

unaddressed, will lead to a steady erosion of our ability to perform key functions, including in the verification and safety fields. To this end, and to remedy this unsustainable situation," the director general said, "I have initiated a study to examine the programmatic and budgetary requirements of the agency over the next decade or so. A solution to the long-term funding question will necessarily involve a variety of technical, institutional, and political elements."

Now, turning to—from the support for the IAEA safeguards to the promotion of reliable fuel supply, the administration has also used existing authority to actively pursue the development of fuel supply mechanisms for countries that forgo enrichment and reprocessing. The role of fuel supply mechanisms in nonproliferation policy was succinctly stated by the IAEA Director General, Mohamed ElBaradei as follows: "By providing reliable access to fuel at competitive prices, we remove the incentive for countries to develop indigenous fuel cycle capabilities, and address concerns about dissemination of sensitive fuel cycle technologies."

I might point out, as noted in S. 1138, in 2005 the United States announced plans to downgrade 17.4 metric tons of highly enriched uranium, excess to our defense needs, to establish a reserve in support of the fuel supply assurances. The amount of HEU will produce some 290 metric tons of low-enriched uranium at a current market price, we're told by DOE, valued at about $1 billion. This was followed, in 2006, by several fuel supply initiatives.

On May 1 of last year, the United States, France, Russia, Germany, the Netherlands, and the United Kingdom submitted to the IAEA a concept for reliable access to nuclear fuel. Under this six-country proposal, the IAEA would have a key role in facilitating new commercial arrangements if a country should find its fuel supply interrupted for reasons other than failure to comply with its nonproliferation obligations. As a last resort, reserves of nuclear fuel held nationally or by the IAEA could act as a backup mechanism. Eligibility to receive fuel supply would be based, among other things, on a country's record of compliance with the IAEA safeguards, its acceptance of international nuclear safety standards, and its reliance on international market, rather on indigenous sensitive fuel cycle activities.

In the fall 2006, the United States participated in an IAEA special event on fuel supply assurances in Vienna. At that event, as noted in the legislation—the proposed legislation—the Nuclear Threat Initiative announced plans to contribute $50 million to the IAEA to help create a low-enriched uranium stockpile owned and managed by the IAEA, but made it contingent upon matching funds of $100 million in funding or an equivalent value of LEU from other sources. The United States supports this proposal to create the LEU stockpile administered by IAEA.

To address fuel assurances over the long run—or the longer run—in February 2006, the United States announced the Global Nuclear Energy Partnership, or, as it's come to be called, the GNEP. Under GNEP, the United States, with other partner nations, would develop advanced nuclear fuel technologies that would result in less waste, more energy without pollution or greenhouse gas emissions, and reduce the risk of proliferation. When these technologies are fully deployed, states with advanced fuel cycle ca-

pabilities would join together to provide comprehensive, reliable fuel services to countries that choose not to pursue enrichment and reprocessing.

Earlier this month, on July 3, President Bush and President Putin of Russia, issued a Joint Declaration on Nuclear Energy and Nonproliferation. Under the joint initiative, the United States and Russia will work together, with other nuclear supplier states, to develop mutually beneficial approaches for states considering nuclear energy, including the provision of reliable nuclear fuel services.

Mr. Chairman, at this point in time, I will skip the next section in my statement in order to save time, and the next section deals more explicitly with S. 1138, and provides a description and some analysis of that legislation. And I'll just leave that with the committee.

But let me just note, at this point in time, that, once again, the overall objectives of this bill—to enhance nuclear safeguards and to provide assurances of nuclear fuel supply to countries that forgo certain fuel cycle activities—comport very well with the policy objectives of this administration.

Mr. Chairman, let me conclude by emphasizing, once again, the importance of nuclear nonproliferation for the security of the United States, both strong IAEA safeguards and the creation of reliable fuel supply mechanisms can make an important and effective contribution to preventing the spread of nuclear weapons. The potential of the latter was highlighted by President Bush in the 2004 speech that I alluded to, and every other administration since the founding of the IAEA has supported strong IAEA safeguards.

Again, let me say that we welcome and appreciate the support for these policies reflected in S. 1138, and are more than willing to work with the committee and the staff to help move this forward.

Thank you.

[The prepared statement of Dr. Semmel follows:]

PREPARED STATEMENT OF DR. ANDREW SEMMEL, ACTING DEPUTY ASSISTANT SECRETARY OF STATE FOR NUCLEAR NONPROLIFERATION POLICY AND NEGOTIATIONS, DEPARTMENT OF STATE, WASHINGTON, DC

INTRODUCTION

Senator Casey, Senator Lugar, and members of the committee, thank you for the opportunity to testify at this hearing on "Safeguarding the Atom: Nuclear Energy and Nonproliferation Challenges." In his speech at the National Defense University in February 2004, President Bush highlighted the importance of nuclear nonproliferation for American security in the post-9/11 world. He described how the subjects of this hearing—strengthened IAEA safeguards and assurance of reliable fuel supplies—support our nonproliferation policies. "We must," the President stated, "ensure that the IAEA has all the tools it needs to fulfill its essential mandate." At the same time he called for the creation of "a safe, orderly system to field civilian nuclear plants without adding to the danger of weapons proliferation." To this end, he proposed that "the world's leading nuclear exporters should ensure that states have reliable access at reasonable cost to fuel for civilian reactors, so long as those states renounce enrichment and reprocessing. Enrichment and reprocessing are not necessary for nations seeking to harness nuclear energy for peaceful purposes."

Since the time of that speech, the promotion of these measures has been an important part of our nonproliferation policies. The bill that is the focus of this hearing, S. 1138, the "Nuclear Safeguards and Supply Act of 2007," also seeks to advance these goals. In particular I would call attention to the "declaration of new policy" in section 102(b) of the bill, which reads: "It shall be the policy of the United

States to discourage the development of enrichment and reprocessing capabilities in additional countries, encourage the creation of bilateral and multilateral assurances of nuclear fuel supply, and ensure that all supply mechanisms operate in strict accordance with the IAEA safeguards system and do not result in any additional unmet verification burdens for the system." We are actively pursuing these goals through diplomacy and under existing constitutional and statutory authority. We have already undertaken important measures to strengthen the IAEA safeguards and develop reliable fuel supply mechanisms.

IAEA SAFEGUARDS

As pointed out in S. 1138, the array of challenges facing the IAEA safeguards system in recent years is likely to continue and require more safeguards resources in the future.

First, the IAEA has been conducting prolonged and intensive investigations dealing with noncompliance which it must undertake with high priority; the circumstances in Iran and now, once again, with the DPRK are well known to you.

Second, the number and size of declared nuclear activities under safeguards agreements continue to grow. The agency is required by legally binding safeguards agreements to perform most of these activities. In the short term, the IAEA is being asked to safeguard large new fuel cycle facilities in Japan, and we also expect growth in safeguards activities in new areas, such as India.

In the longer term, as pointed out in S. 1138, there is renewed interest worldwide in nuclear energy as an important component of the world's energy supply, and the number and size of nuclear facilities around the world will continue to grow, and likely accelerate.

Third, the recent efforts to strengthen safeguards require new safeguards activities. As more states bring safeguards agreements and Additional Protocols into force, or adhere to strengthened versions of safeguards agreements, the Agency's workload increases.

Fourth, new safeguards activities require efficient, effective, and state-of-the-art technological, methodological, information and communication infrastructure in support of its verification regime. Some of this infrastructure is provided in the Agency's regular budget; however, the IAEA must rely on voluntary contributions from donor states to purchase other equipment and services to carry out its verification function.

To address these challenges the IAEA relies on funding from its regular budget and voluntary contributions. The United States has consistently been a strong supporter of the IAEA, and its verification activities in particular. However, the distribution of regular budget funding between verification activities and other Agency activities is often a source of contention, with many developing member states relentlessly arguing that more resources should be allocated for technical cooperation.

In 2003, a U.S. initiative resulted in an increase in the Agency's regular budget of approximately 20 percent, spread out over the last few years. Much of this increase was allocated toward safeguards.

For 2008–2009, the Agency requested an 8.5-percent increase in its regular budget. About a quarter of this increase was for safeguards, and over half of the remaining amount was for expenses (such as computer systems) that support all IAEA activities. However, the Board of Governors agreed to a 4.2-percent increase for 2008–2009, but this amounts to just 1.4 percent of which is real growth in the Agency's budget.

Given the constraints in the regular budget, a significant portion of the Agency's safeguards budget is derived from voluntary contributions. The United States is by far the largest contributor; this year we are providing $53 million in voluntary contributions, including about $21 million for safeguards. The safeguards contribution includes $14 million for the U.S. Program of Technical Assistance to IAEA Safeguards—POTAS—and funding for sample analysis and safeguards equipment. There is also about $3 million to be used, as needed, in the DPRK.

It is likely the Agency will face challenges with regard to finding adequate resources in the future. The IAEA Director General noted in a June statement that he believes that ". . . the Agency remains underfunded in many critical areas, a situation which, if it remains unaddressed, will lead to a steady erosion of our ability to perform key functions, including in the verification and safety fields. To this end and . . . to remedy this unsustainable situation, I have initiated a study to examine the programmatic and budgetary requirements of the Agency over the next decade or so." A solution to the long-term funding question will necessarily involve technical, institutional, and political elements.

RELIABLE FUEL SUPPLY

Turning from support for IAEA safeguards to the promotion of reliable fuel supply, the administration has also used existing authority to actively pursue the development of fuel supply mechanisms for countries that forgo enrichment and reprocessing. The role of fuel supply mechanisms in nonproliferation policy was succinctly stated by IAEA Director General Mohamed ElBaradei as follows: "By providing reliable access to . . . fuel at competitive market prices, we remove the incentive for countries to develop indigenous fuel cycle capabilities . . . and [address] concerns about dissemination of sensitive fuel cycle technologies."

U.S. ACTIONS

As noted in section 203(2) of S. 1138, in 2005 the United States announced plans to downblend 17.4 metric tons of highly enriched uranium excess to our defense needs to establish a reserve in support of fuel supply assurances. This amount of HEU will produce about 290 metric tons of low-enriched uranium, and at current market prices is valued at over $1 billion. This was followed in 2006 by several major fuel supply initiatives. On May 31 of that year, the United States, France, Russia, Germany, the Netherlands, and the United Kingdom submitted to the IAEA a concept for reliable access to nuclear fuel. Under this six-country proposal, the IAEA would have a key role in facilitating new commercial arrangements if a country should find its fuel supply interrupted for reasons other than failure to comply with its nonproliferation obligations. As a last resort, reserves of nuclear fuel, held nationally or by the IAEA, could act as a backup mechanism. Eligibility to receive fuel supply would be based, among other things, on a country's record of compliance with IAEA safeguards, its acceptance of international nuclear safety standards, and its reliance on the international market rather than on indigenous sensitive fuel cycle activities.

In the fall 2006, the United States participated in an IAEA "Special Event" on fuel supply assurances in Vienna. At that event, as noted in section 203(3) of S. 1138, the Nuclear Threat Initiative announced plans to contribute $50 million to the IAEA to help create a low enriched uranium stockpile owned and managed by the IAEA, but made it contingent on matching funds of $100 million in funding or an equivalent value of LEU from other sources. The United States supports this proposal to create an LEU stockpile administered by the IAEA.

To address fuel assurances over the longer term, in February 2006 the United States announced the Global Nuclear Energy Partnership, or GNEP. Under GNEP, the United States, with other partner nations, would develop advanced nuclear fuel technologies that will result in less waste, more energy without pollution or greenhouse gas emissions, and reduced risk of proliferation. When these technologies are fully deployed, states with advanced fuel cycle capabilities would join together to provide comprehensive, reliable fuel services to countries that choose not to pursue enrichment and reprocessing, to ensure the availability of fuel, and a commitment to take back spent fuel.

Earlier this month, on July 3, President Bush and President Putin of Russia issued a Joint Declaration on Nuclear Energy and Nonproliferation. Under the Joint Initiative, the United States and Russia will work together with other nuclear supplier states to develop mutually beneficial approaches for states considering nuclear energy, including the provision of reliable nuclear fuel services.

S. 1138

I would like to focus the remainder of my comments more narrowly on the text of S. 1138. Let me begin by noting once again that the overall objectives of this bill—to enhance nuclear safeguards and to provide assurances of nuclear fuel supply to countries that forgo certain fuel cycle activities—comport well with the policy objectives that the administration is seeking to achieve. However, some individual provisions raise issues which we believe could make it more difficult to achieve these objectives. My comments are offered with the intention of further improving this legislation.

We agree generally with the various assessments in section 101 identifying challenges facing the IAEA's safeguards regime. The United States and the IAEA are working to strengthen safeguards by seeking universal adherence to the Additional Protocol and by upgrading the Small Quantities Protocols. We welcome the attention given to the IAEA's human capital problems, an area we have repeatedly raised with the Agency. This is a concern not only for the operation of the Safeguards Analytical Laboratory, or SAL, in Seibersdorf, Austria, but more generally for the IAEA Safeguards Department as a whole.

Turning to section 103 of the bill, we agree that there is a need for carefully considered upgrades to SAL. It is not clear, however, that expending the full $10 million solely on the refurbishment or replacement of SAL, as proposed by section 103(a), would be the most effective way to strengthen the IAEA's analytical capabilities. In November 2006, the IAEA held a workshop at SAL, attended by laboratory experts from member states, to determine what should be done to ensure that SAL would be able to continue to perform its mission. These experts generally agreed that while some infrastructure upgrades were needed, and the possibility of expansion should be considered, there was no pressing need for an entirely new laboratory. U.S. experts believe that the biggest threat to SAL's analytical capabilities is not the age of the equipment, which, if properly maintained, can have a long service life. Rather, it is the availability of qualified staff to run the machines and interpret the results, a problem also identified in section 101(13). We also understand that the Director General of the IAEA has set up a committee to further review the need for improvements at SAL. We therefore suggest the funds be targeted more flexibly, to address not just the refurbishment of SAL, but also to meet other IAEA safeguards equipment and personnel needs.

I would note with regard to section 104 of the bill, that the U.S. Program of Technical Assistance to IAEA Safeguards, or POTAS, is a well-established program, by far the strongest in the world, supporting the technical implementation of IAEA safeguards and safeguard-related R&D. The current level of sophistication of IAEA safeguards is due in no small part to the contributions made by the U.S. support program over approximately 30 years. We fully agree with the objectives indicated in that section and the need for a strong U.S. technology base. This is of fundamental importance to continuing U.S. leadership and the credibility of the IAEA safeguards system.

S. 1138: TITLE II

As a general matter, we welcome the support for our efforts to establish reliable nuclear fuel supply mechanisms provided by title II. We also welcome the support in section 203 for the concept of an international fuel bank involving the IAEA. However, we believe that title II should instead be drafted as a resolution expressing the sense of Congress, or as Statements of Policy, because, as section 201(c) makes clear, this legislation is not intended to provide any authority additional to that under the Atomic Energy Act or other preexisting laws and regulations. The President already has the authority to work both bilaterally and multilaterally toward achieving such mechanisms, and such efforts are well underway.

In our discussions at the IAEA and elsewhere, we have found that other countries are deeply sensitive to whether a fuel supply mechanism will impose actual or apparent limitations on their sovereignty. Avoiding the appearance of such limits will be important in determining whether or not a supply mechanism will be widely accepted. Section 201(a) of the bill acknowledges the importance of honoring national sovereignty by stating that fuel supply mechanisms should be open to states that "decide" to forgo enrichment and reprocessing.

However, section 201(b) describes several factors that, if incorporated into legislation on fuel supply mechanisms, will almost certainly be perceived as an effort to erode the sovereignty of potential recipients. For example, it is unclear whether section 201(b)(7) contemplates that all the legal restrictions on retransfer of U.S.-origin nuclear material should apply to transfers of foreign-origin nuclear material funded in whole or in part by United States contribution. If this is the intent of the provision, consideration of this factor may make it more difficult, as a practical matter, for the United States to financially support an IAEA fuel bank as proposed by the Nuclear Threat Initiative in 2006.

Moreover, section 201(b)(9) provides that the supply mechanism should take into account whether potential recipients have export controls "comparable" to our own. Section 201(b)(10) provides the mechanism to take into account the "conformity" of the recipient state's safety and regulatory regimes with similar U.S. laws and regulations. Legislation containing these or similar provisions would likely be seen by other States as an unacceptable attempt to impose our domestic standards, rather than internationally accepted standards, and may ultimately be counterproductive to our efforts.

The required "Report on the Establishment on an International Fuel Authority" in section 202(a) can make an important contribution to the discussion of nuclear fuel supply assurances. The issues identified as requiring evaluation in section 202(b) are important ones. However, producing a solid and credible report will require significant time and resources, both financial and personnel. We are frankly

concerned about our ability to produce a quality report in the timeframe specified in section 202(a).

At the June meeting of the IAEA Board of Governors, the Secretariat provided members of the Board with a draft report on fuel supply mechanisms and the potential role of the IAEA. This report will be discussed and debated at subsequent meetings of the Board. The 180-day deadline in section 202(a) may not be long enough for the report to Congress to take account of the debate and decisions of the Board on fuel supply. We suggest that a deadline of 365 days, with a brief progress report after 180 days, might be a more realistic timeframe.

CONCLUSION

Let me conclude by emphasizing once again the importance of nuclear nonproliferation policy for the security of the United States. Both strong IAEA safeguards and the creation of reliable fuel supply mechanisms can make an effective contribution to preventing the spread of nuclear weapons. The potential of the latter was highlighted by President Bush in 2004, and every U.S. administration since the founding of the IAEA has supported strong IAEA safeguards. We welcome the support for these policies reflected in S. 1138.

Senator CASEY. Doctor, thank you very much for your testimony.

We'll start questions now, and we'll start with 7-minute time periods. And I'll start and ranking member, Senator Lugar, will follow me and we'll see from there where we go.

Doctor, you and others today have highlighted this question of worldwide demand in the growth of nuclear power and the urgency that some countries feel to have a reliable source of energy. Currently, there are 435 commercial nuclear powerplants operating in 30 countries around the globe, with a combined capacity of 370 gigawatts, or approximately 16 percent of the world's electricity. We have states like China, India, Pakistan, Japan, Russia, the Republic of Korea, and the United States all stating their intention to expand their nuclear power sectors. And then, we have several other states—namely, Egypt, Jordan, Nigeria, Indonesia, and Turkey—announcing intentions to build their first nuclear reactors. Now, many of these countries are planning or constructing enrichment or reprocessing facilities. They're doing that for the first time.

Doctor, the first question I'd ask is: By how much, and where, will nuclear power expand globally in the coming two decades? If you can elaborate on what I just outlined.

Dr. SEMMEL. Thank you, Senator.

We know that all the forecasts that have been made by those who watch this issue very closely are that there will be this expansion that you alluded to. There is agreement that the countries you listed—you mentioned in your preface to your question, China and South Korea, and—certainly have intentions to build new power reactors in large numbers, particularly in China. I think it's very likely that we'll see a growth in the number of power reactors in India in the coming future. Obviously, there will be a growth, as we saw even in the Washington Post this morning, the front page—there would be growth in the number of reactors here in the United States and in Russia, and in a number of other countries. I think, in the case of France, which I believe derives something like 70 percent of its electricity from nuclear power—it may be the largest country that does that—will probably hold steady and perhaps have some limited growth.

The other countries you mentioned—Egypt, Turkey, Jordan—Jordan, there was a Jordanian delegation that came to see us not too long ago, expressing some interest in developing some nuclear ca-

pabilities. Vietnam is another country—Yemen, Turkey, too. These are countries that have expressed an interest to begin to develop power reactors in their countries. I would say, on that score, Senator, that, given the lack of infrastructure in the latter set of countries that I just mentioned, the prospect of their having nuclear facilities in operation would probably be at least a decade or more in the future, rather than something that we would face immediately.

So, I think you—those are the countries you mentioned—I think those are the right countries. We are certainly going to see an upward growth in interest in nuclear energy that would be reflected in the number of nuclear reactors that countries will have; yes.

Senator CASEY. And are there countries that you would add to that list—I know you mentioned two that I had not, Yemen and Vietnam, and maybe one other—but is——

Dr. SEMMEL. I'm sorry?

Senator CASEY [continuing]. The combined list that we both outlined, you don't think you'd add any other countries to that.

Dr. SEMMEL. Well, there may be others out there. I think there's a growing interest in this for countries that want to engage in deriving nuclear power that is environmentally friendly, that it's not going to emit emissions. I suspect, in some of the more—even in the nuclear weapons states, we're going to see a growth in nuclear reactors. Certainly, that's the case here in the United States—we'll see substantial growth—and in Russia, as well, and China.

Senator CASEY. Then, when you juxtapose that demand and that reality with the ability of the United States, and certainly the ability of the IAEA, to deal with this challenge, what can you tell us about that? How do you—what do you see? If you were looking forward into the future, as it stands now, with the current capacity and budget and infrastructure and all of the factors that we would analyze with regard to what the IAEA can do, as well as what the United States is currently doing, and able to do, what's your analysis of that—in other words, the current capacity to deal with a real threat, in terms of the demand for nuclear power?

Dr. SEMMEL. In terms of the real threat, I think there's much that needs to be done. I think some of the proposals—the proposals, certainly, that are in the legislation that Senator Bayh described earlier, are critical components of dealing with that threat. We certainly—as a very high priority—we certainly don't want countries that have aspirations for developing nuclear power to develop their nuclear fuel cycle by getting access to enrichment and reprocessing technology. That is very, very high priority, in terms of our nonproliferation approach to the nuclear issue. In some of the countries that we mentioned, I think you will find that the expansion in these countries may be contingent upon a number of things. We've—I mentioned a number of countries, you've mentioned a number of countries, but I think the reality is that this growth that we anticipate is likely to be conditioned by a number of other factors, not the least of which would be domestic sensibilities in certain countries, access to capital—it's very expensive to build nuclear reactors—the question of whether countries, like the latter list of countries I mentioned, have the appropriate infrastructure to be able to actually build and maintain and run, and manage satis-

factorily, nuclear reactors, remains to be seen. That's why I say, these countries are not likely to have nuclear reactors, power reactors for some time, for a decade or so, until they develop this necessary infrastructure.

So, a number of countries have to build up from the base because they lack that infrastructure at this point in time. So, these are the kinds of factors, I think, that will be critical in shaping the growth rate trends that we're likely to see over time.

Senator CASEY. My time is up, but I'll come back. Thank you.

Dr. SEMMEL. Sure.

Senator Lugar.

Senator LUGAR. Well, thank you very much, Mr. Chairman. I would just mention what is, I suppose, obvious, but probably important to say, in terms of common sense, as to why the American public would be interested in the subject that we are discussing today. And it comes down to this, that, as a country, we're busy proposing to the Chinese, to the Indians, to others, that they utilize nuclear power to a much greater extent. We believe that this is important as we take a look at the climate change issue, as well as the fact that the scarce resources of the Earth could bring about a vast contest among nations, and potential conflict, if we and they are not thoughtful about the sources of energy that are going to be required; in this particular case, electricity.

And so, as a result, even as we push nations who already have these supplies, in part—and industries—to do more, we are also stimulating interest and demand of other nations that may not have gotten into the nuclear business; or, if they have, have slid in through the side door in ways that may not be desirable. So, in an international way, the IAEA is mentioned again and again as a party that deals not as a United States fuel bank, but as an international fuel bank in which we encourage that, and we encourage a budget for IAEA, and the staff and the facilities and what have you, to do their jobs, so that there can be an umpire in this huge international contest, in essence, to make certain that the fuel is available at reasonable prices, but that it's used for peaceful purposes, and that the other side of the bargain is that you do not progress on to try to enrich uranium and build nuclear weapons.

Now, that's a fairly simple focus, but it's a profoundly important one as all the nations of the world try to divine their foreign policies and their security policies. And it's important, really, to be able to state it forthrightly and clearly so that every nation knows where we are headed, what our support is, and what we are prepared to do, really, to enhance this international understanding.

Now, you've stated that very well in your testimony, Dr. Semmel, as has my colleague Evan Bayh, but let me just ask these questions.

The administration—our administration has taken steps toward creation of a nuclear fuel bank with an announcement by the Department of Energy it's awarded a contract to download 17.4 metric tons of United States highly enriched uranium and store this material for use in a reliable fuel supply program. Material would be converted to low-enriched uranium and administered by the IAEA. Has the administration done, just in terms of the nitty-

gritty of this, a legal analysis of its proposed approach to ensure that all U.S. laws and regulations will be met? And, if not, which of these need to be changed to permit fuel supply to certain countries? And, if you do not have the answer on top of your head, would you furnish the committee with such analysis for the benefit of our record?

Dr. SEMMEL. Thank you for the last part of that question, Senator. We will get you a response on that, in detail.

Senator LUGAR. I think it's important——

Dr. SEMMEL. Yes.

Senator LUGAR [continuing]. Just as we round out all parts of this approach.

[The written information submitted by Dr. Semmel follows:]

The administration has been and will continue to be sensitive to the need to comply with existing laws and regulations when implementing any mechanism for fuel supply assurances to other countries. The legal analysis process will continue as the details of the various proposals are developed in discussions at the IAEA and elsewhere. In particular, we will want any fuel supply mechanism we support to have strong nonproliferation obligations as a condition of supply and we will continue to press for a mechanism that will enable the greatest possible U.S. involvement, consistent with our existing laws and regulations. However, until the details of such a mechanism are worked out we will not be in a position to evaluate whether any specific changes in the law would be required to support a program beneficial to our nonproliferation goals.

Now, in May of this year, I wrote to Secretaries Rice and Gates questioning why it's taken more than 8 months since the passage of implementing legislation for the U.S. Additional Protocol for the administration to bring it into force. A month later, I was given a response from the State Department which essentially said that all regulations were not yet completed. Two months later, the Department of Defense wrote to me, stating they were waiting for the Departments of Commerce and others to finalize the regulations. Can you give us any indication by what date all the necessary regulations from all the necessary Departments will have been approved to implement the U.S. Additional Protocol?

Dr. SEMMEL. Thank you, Senator.

Let me say, first of all, thank you for responding to President Bush's urgings in February 2004, and the response that the Foreign Relations Committee and the Senate was very rapid in terms of providing its advice and consent on the Additional Protocol by the end of March 2004; a very expeditious response. And the implementing legislation that was passed December of last year puts us on a fairly high level to move the additional protocol forward, in terms of ratification down the line. It's my understanding on this that the Department of Commerce and the Department of Defense, Department of Energy, are deeply involved in looking at all the requirements that are built into the implementing legislation. This is a very costly process. I know the Department of Commerce commented to us in the past of how expensive it really is for them to do the vulnerability assessments and the like.

I can't give you a precise timetable. If we were to get these necessary elements of the implementing legislation done in a reasonable way, I would suspect that we would not be able to do it before the end of the year, as I'm told by those who are responsible for the mechanics of getting this information—deriving this informa-

tion. It likely would be sometime next year, but I can't precisely predict that.

I'm as interested as you expressed to move this legislation quickly. I think, with the United States ratifying the Additional Protocol, it sends a signal to other countries that have not yet either signed an additional protocol or put one in force, that we had done this. I think this is a positive sign. And, of course, this is what we want other countries to do.

So, we ought to act expeditiously by example. I'm hoping we can move this process. I can tell you that there is considerable amount of energy being devoted to fulfilling the requirements of the implementing legislation so that we can get the necessary regulatory measures in order.

Senator LUGAR. Well, I thank you for that response. You've acknowledged how important this is. One of the purposes of our legislation we're considering today is, once again, to try to bring some unity with all of these different aspects. But this is something on which we've taken action, and the administration asked us to take action. And so, we will continue to try to monitor this in our oversight capacity, which you understand, we are very hopeful that the administration will move forward more rapidly.

Let me yield to the chairman. I'll have a couple of more questions, if that's possible, in a second round.

Senator CASEY. Sure.

Senator LUGAR. Thank you.

Senator CASEY. Absolutely.

Doctor, I wanted to return to some of the matters that we dealt with a few moments ago, and, in particular, one—for people watching this and listening or reading the testimony, I think they get a sense of what we're talking about here with regard to the challenge, generally, or globally, but also the particular challenge that the IAEA faces in being the one agency in the world that has to deal with this surge of demand for nuclear power and also the threat posed by terrorists, of course, and certainly in states like Iran, to abuse the process, or to use a civilian cover for what is a nuclear weapons intention. And I wanted to ask you just to—if you could, in very basic terms, to describe the current state of the IAEA with regard to—we've heard a lot about workforce, and the retirement or turnover of key personnel, their inability to bring in, sometimes, the expertise they need; Senator Bayh, in his testimony, referred to 1970s equipment or technology; and all of those kinds of descriptions. If you can just give us an assessment of—even if you have a short list or examples of what this means, in terms of what the IAEA has to—IAEA has to deal with every day, and how the United States can be a leader across the world in making sure that this shortfall on infrastructure or personnel or expertise or technology or equipment can be rectified rapidly because of the threat.

Dr. SEMMEL. Well, thank you. I think—at the end of the day our interests are that the IAEA have the capability to be able to deter and detect undeclared facilities and activities in the world. And so, it has to have the capability to do that. And the capabilities range across a spectrum of issues, anywhere from those that you mentioned—you've got to have skilled practitioners and personnel, not only in the Seibersdorf Analytical Lab that was mentioned earlier,

but also other managers and skilled personnel. You've got to have adequate resources to be able to buy the equipment, to pay salaries, to build infrastructure, so that it is a modern, up-to-date, skilled, smooth operation. You have to have the cooperation of the international community. It's very difficult. I mentioned, I think, in my opening statement about the difficulties, for example, of the IAEA securing anything close to what the Director General had proposed in his budget, which was an 8.5-percent increase for the next biennium. The member states themselves, which operate in a consensus-based decision process, obviously did not agree with that. So, it's very difficult to get the international community to agree on the same priorities that we have, or that the Director General of the IAEA may have, as well. So, trying to convince the rest of the world that these are the high priorities that we know they are, is a very difficult process, and that requires a lot of diplomacy, occasional demarches, and so forth.

We also have got to make an effort to ensure that the IAEA has the tools necessary to do its job; that countries have comprehensive safeguards agreements, which allows the IAEA to do the inspections, to gather information, to report on their activities, and so forth; that the countries sign on to, and put in force, additional protocols which allows the IAEA to do even more in terms of timely inspections, to gather more information that would otherwise not be available; to interview individuals to ensure that the materials that they have are not being diverted from peaceful to nonpeaceful purposes.

These are the kinds of things that the IAEA needs; any organization that has a defined mission needs these kinds of attributes. And, in some cases as has been alluded, they're a need in the IAEA, and we, as the principal funder I might point out—we, the United States, as the principal funder—both the assessed budget as well in the voluntary budget—have been in the forefront of trying to provide these kinds of resources and these kinds of skills, equipment, technology, and the like.

So, the credibility of the IAEA is absolutely essential to the strengthening of the nuclear nonproliferation regime. If the IAEA is unable to measure up to the changes that have taken place, that we've alluded to here, in terms of the growth of reactors, a growth in nuclear power, and the nexus between nuclear materials, nuclear weapons, and the desire on the part of terrorists to acquire them, or use them, and to deal with that issue by protecting physical plant, protecting the materials, I think the chances that—the consequence of that would be a weakening of the nonproliferation regime, and we don't want that to happen.

Senator CASEY. I've only got a little more than a minute, I want to get one more question in here. We'll try to come back to this, because I have others. But, in light of the recent news about the article 123 agreement and what the United States is doing with regard to India, do you have a concern about, and should we be concerned about, a perception of a double standard when we say this—we're saying what we're articulating today about the concern we have about proliferation, and then there are some countries around the world who raise questions about our agreement with India?

And if you could—I know I only have about 30 seconds, I'll try to come back to it, as well—but what's your sense of that?

Dr. SEMMEL. Well, this is an issue that's obviously been debated, not just out on the airways and the mass media and the think tanks, but also here in the Congress. Congress, in both Chambers last year, voted very strongly in both the House and the Senate, in support of the bill that would basically treat India as an exception to the standards that countries lacking full-scope safeguards ought to be treated.

Without getting into the particulars of the 123 agreement, needless to say, it was a very difficult negotiation, it took several years. I think, on balance, when you measure the outcome, what comes out the back end of that negotiation, is that we're very pleased that India has made a number of commitments that it would not, perhaps, have otherwise made, in terms of adhering to a number of international nonproliferation standards—in the Nuclear Suppliers Group, in the Missile Technology Control regime, and others. So, I think one of the net effects of this initiative, from the positive standpoint of nonproliferation—and I don't want to oversell the nonproliferation gains here, I think it's implicit in your question—but one of the benefits is that we do bring India closer into what has been dubbed the mainstream of international nonproliferation practices. And I think that's clearly a net gain.

The relationship between the United States and India goes beyond, obviously, the 123 agreement and the Civil Nuclear Cooperation Initiative. It has much to do with our relationship, our strategic relationship, in terms of what the world is evolving into in the next decade or so, with a country that has a burgeoning economy; a country that is the second largest population in the world, soon to be the largest, perhaps; a country that is a practicing democracy. These are all positives. I think that we need to solidify that relationship. And the Civil Nuclear Cooperation Initiative, which would allow India to begin to address its own energy problem in its growing economy is a very strong positive.

Senator CASEY. Thank you. I'm out of time, and I'm actually over.

Senator LUGAR. Why don't you just go ahead?

Senator CASEY. Well, I'll defer to the ranking member.

Senator LUGAR. Thank you, Mr. Chairman.

Let me just follow through on some of the questions that the chairman has raised about the IAEA. You've discussed the budget problems, and the United States at least has attempted to be helpful, with an increase in our allocation. Obviously, the viability of the legislation we're discussing today is dependent upon the IAEA, because the United States would have made a conscious decision that the international community, as a whole, as represented by that agency, is going to be the major monitor of all of this. So, if, in fact, the facilities are inadequate, the budget is inadequate, we have a major problem to begin with.

In other words, from the beginning, rather than being accused of unilateralism, in which we have the fuel bank here, the United States, everybody comes to the well here, and we take care of their needs, and so forth; we recognize the importance of the international understanding and the other parties involved, in the head-

quarters in Vienna and elsewhere. And so, that's an important foreign policy declaration, but this is why the budget situation is important.

Now, you've pointed out that when the nations met to talk about the budget, and the director, Mr. ElBaradei, says, "I need 8½ percent more," or whatever—so forth, they were not very forthcoming. Now, can you describe that process a little bit? What are the interests of the other nations involved in this? And how intense, really, is their interest in the IAEA? And, in the event we were to proceed with the assumption that this really does become the monitor of the fuel bank business, what confidence level can we, or anybody else, place in this monitoring agency if it has a need for international understanding each year simply to have a budget?

Dr. SEMMEL. Senator, I agree, totally, with the premise of your question. If the IAEA's going to be preeminent in monitoring peaceful nuclear programs around the world, it has to have the resources and the capability to do that.

In terms of the dynamics of what took place at the IAEA, it wasn't in those protracted budgetary discussions. We know about protracted budgetary discussions on the Hill. I can say that, back in 2004, the United States took the lead, in fact, eventually succeeded, after what I like to call a sort of, hand-to-hand combat, was able to increase the budget by 20 percent over the 4 years, as I mentioned. It was not an easy task. And some of our friends, as well as others, were resistant to this budget increase. We saw the same reoccurrence of this phenomenon in this latest budget debate, which, again, took several sessions in the IAEA. There are a number of countries who simply, for a variety of reasons, don't want these funds to increase—they may have problems back home, so it's pure bureaucratic problems finding additional resources there that is not perceived to benefit any domestic needs, and so forth.

But I'm surprised that there are a number of countries in Western Europe, for example, who have been resistant to budget increases. Many of the countries would like budget increases, but would like the funds allocated in different ways. And, if they're not going to be allocated in different ways, they're resistant to having those budget increases. For example, many of the nonaligned countries—so-called developing countries—want substantially larger portions of those resources devoted to technical cooperation in the areas of medicine and health, environment, desalinization, and so forth.

And if they don't perceive that these funds would move in that direction, they're more resistant to actually supporting increases. Now, many of these countries derive most of those benefits from the voluntary contribution, rather than from the regular budget, because the regular budget is geared more toward safeguards and salaries and the like.

So, the dynamics vary from state to state. Each state looks at their own interests. And, with the exception of the United States and a number of our friends—including the Russians, I might point out, who have been very forthcoming in terms of wanting to strengthen the IAEA, strengthen IAEA safeguards, strengthen the resources at the agency—they've been very supportive of these increases. But it requires consensus decisionmaking. Everybody has

to agree, or you don't agree on anything. And that, then, because of that process, you've had to get some lowest common denominator, and that lowest common denominator was a 4.2-percent increase. So, that's the dynamic.

Senator LUGAR. Well, as I've heard your testimony, my mind has sort of wandered over how we can make a difference in this situation. For example, I've mentioned this personal visit out in Vienna in November. I visited with representatives from several countries that were in the headquarters that day, and we had very good conversations. But when I went out to the laboratory and I asked how many representatives of other countries have ever visited this laboratory; a very short list. And I will not embarrass any country by indicating that its ambassador or its representatives never darkened the door of the laboratory, but this is not a regular stop, nor the nitty-gritty of the process.

Now, this August, I'm—plan to visit with my former colleague Sam Nunn, with the Russians again, and you've indicated they've been helpful. This may be a way in which we try to work together to encourage others, because clearly we're going to need some allies out there at the IAEA if we're going to have a budget, if we're going to have laboratories and facilities. And when I talk about the threat to the personnel, you know, I've experienced the fact that the blowback and so forth is a dangerous situation; you don't want to stay in the laboratories too long.

So, we talk in generalities about international organizations and how, in the best of things, these all work out, but the nitty-gritty is pretty important, too, and this is why I've taken this opportunity of this hearing for somebody to try to make some statements, as well as raise some questions, about the need for international understanding if we're really to progress in what I think is a big idea, and an important one, which we generally would agree. The same predicament, often, with our—as you know, with our NATO budgets, everybody's downsizing the defense budget, downsizing the number of people that might be available for duty. And such is the nature of international negotiations. But this is a pretty critical one. It can't start and stop every year. The need for continuity is really of the essence.

So, I thank you very much for your testimony and this opportunity to visit with you.

Dr. SEMMEL. Senator, if I may offer just one comment on that. Because of the strains on the regular budget that we were talking about, the agency has had to rely more on voluntary contributions, not just from the United States, but from other countries as well.

Senator LUGAR. I see.

Dr. SEMMEL. Voluntary contributions in cash, as well as in kind. And, of course, this is very helpful, because the voluntary contributions are designed to fill gaps that the regular budget cannot handle, cannot fund. But voluntary contributions oftentimes have strings attached to them. Up here in Congress, they are called earmarks. They can fund, adequately, one-time projects, whatever it may be—equipment and things like that. But, it's very difficult to fund long-term projects.

And so, we have tried to do that. As I say, we are the largest contributor to the voluntary—the so-called extra-budgetary con-

tributions. I think our contribution this year is $53 million. Much of that goes to—a good chunk of that goes to safeguards, obviously. So, that's one way in which we make up, in terms of showing our bona fides, by making funds available to the IAEA through the voluntary contribution, in addition to our assessed contribution.

Senator LUGAR. Thank you.

Thank you, Mr. Chairman.

Senator CASEY. Doctor, I have one more question. Any system of an assured nuclear fuel supply mechanism has to have as its foundation—the undergirding of that, really—is a sense of reliability, that countries agree to pursue this peaceful track, so to speak, so that—with the understanding that they have a reliable source of fuel. And that's the bargain. But one question which has been raised, and I think I skipped over it before—and I wanted to highlight this—is, we talk about market rates as being enough, and one question that's been raised is whether or not market rates would be an adequate incentive for some countries to make this deal, to agree to this bargain, so to speak. And one question we should ask is whether or not—and I'd ask for your opinion, on behalf of the administration—whether or not it might be necessary to subsidize the nuclear fuel in order to deal with countries that might have trouble with paying the market rate, so to speak. What's your sense of that?

Dr. SEMMEL. On the question of subsidization, that's probably above my paygrade. I think, at this point in time, most of the concepts—all the concepts that we're talking about—the six-country concept that the United States introduced early last year, and all the other reliable access concepts are still in the process of formulation. I don't know whether or not subsidization of nuclear fuel below market rates would make sense, in terms of the market.

I would say this, Senator, that I think people who have looked at this issue much more intensely than I have, have almost universally come to the conclusion that right now the market itself is working well; that is to say there's no problem of availability of nuclear fuel for those countries that seek it, that need it, and because there's ample supply out there right now, and the market is working, and there is some competition. So, there may be more competition in the future as this looks like a much more attractive market with new enrichment facilities being thought of and being developed and constructed. If that competition does, in fact, increase, I think you would find that the market prices would be competitive, would be perhaps even reduced as a consequence of that. But I think what we find is that, in the growth of the demands, if there's not an adequate response in terms of supply, you would then find some pressure on the upward pricing of nuclear fuel and the cost of nuclear fuel.

But subsidization, I think I'll just pass on that one, at this point.

Senator CASEY. And if there's any way that you or the administration can supplement the record on that, I'd appreciate it.

Dr. SEMMEL. Okay. We'll take that.

[The written information submitted by Dr. Semmel follows:]

None of the recent proposals for fuel assurances, including the six-country concept backed by the United States, has raised the issue of subsidies for the purchase of nuclear fuel. The international nuclear fuel market is working well, and all the pro-

posals under discussion assume that the price of fuel will continue to be set by the market. As Dr. Semmel noted in his testimony, the fuel supply proposals are still being discussed and the details are being developed. However, developing an indigenous enrichment or reprocessing capability is a very expensive proposition. With regard to the need for subsidies, we do not currently foresee the market price increasing so drastically that investment in new enrichment or reprocessing facilities would be more economically attractive to any country now considering the adoption of nuclear energy than purchasing nuclear fuel at market rates without subsidy.

Senator CASEY. Doctor, thank you very much for your testimony.

And then, we'll move, now, to the third panel. If those three individuals are here in the room, if they would approach the witness table.

Well, we want to thank the witnesses for their appearance today, and we want to welcome a distinguished group of witnesses here, all of whom today serve in private capacities, and are leading experts on assured fuel supply mechanisms and nuclear safeguards. Each of our witnesses can draw upon substantial experience working on these issues in the United States Government, dating all the way back to the Nixon administration. And I'll give a brief summary of some of their work.

Mr. Henry Sokolski is the executive director of the Nonproliferation Policy Education Center, a nonprofit organization he founded in 1994 to focus on strategic weapons proliferation issues. He served from 1989 to 1993 as Deputy for Nonproliferation Policy in the Office of the Secretary of Defense. Mr. Sokolski has also served as a senior congressional staffer, working for both Senator Gordon Humphrey and Senator Dan Quayle, and he also is a prolific writer on the multiple proliferation challenges facing the international community today.

Thank you very much, sir, for appearing.

Dr. Lawrence Scheinman is a distinguished professor for the Center for Nuclear Nonproliferation Studies at the Monterey Institute of International Affairs. Dr. Scheinman has been involved in nuclear-related matters as an academic and as a government official for over 35 years. He most recently served as Assistant Director for Nonproliferation and Regional Arms Control at the U.S. Arms Control and Disarmament Agency, which, unfortunately, no longer exists. Dr. Scheinman is one of the world's foremost experts on the IAEA and nuclear safeguards.

And, third, Dr. Fred McGoldrick is a principal partner in an international consulting firm and does work for the Departments of State and Energy on nuclear nonproliferation issues. He retired from a distinguished civil service career in 1998, after serving in a variety of positions in both the State and Energy Departments, as well as representing the United States to the International Atomic Energy Agency, where he served as a leading expert on U.S. civilian nuclear cooperation and nonproliferation challenges.

Gentlemen, for the interest of time and for a good dialog with each of our witnesses, I'd ask each of you to limit your oral presentations to 5 minutes each. The remainder of your prepared statements will be formally entered into the record. And I appreciate your cooperation with that, because of time.

And we'll proceed in the order of witnesses as I introduced them. So, Mr. Sokolski, we would begin with you and thank you for your testimony.

STATEMENT OF HENRY SOKOLSKI, EXECUTIVE DIRECTOR, NONPROLIFERATION POLICY EDUCATION CENTER, WASHINGTON, DC

Mr. SOKOLSKI. Thank you. In the interest of time, I will keep it to 5 minutes. There's a good chance you'll get half a thought, but I will proceed.

I want to thank you for giving me this opportunity to testify.

I think, just from listening today, you get the strong sense that we really want to think that the peaceful and military atoms are distinct. They're not.

A study done for my center, in 2004, spelled out the diversion dangers associated with civilian nuclear energy. Tehran, for example, is building a large light water reactor at Bushehr. When completed, this plant could make 330 kilograms of near-weapons-grade plutonium in the first year of operation. That's enough for 50 or more crude nuclear weapons. To extract this plutonium from the reactor's spent fuel, Iran would need to build no more than a small crude chemical extraction facility, 30 by 130 by 65 feet. If you flip over my testimony, the very last page, that thick thing, you'll see a picture of it. It's not big. This would be easy to hide, could be built in roughly 6 months, and be able to be on the ready until needed. Once operating, this plant could produce a bomb's worth of plutonium in as little as 10 days, and another bomb's worth each subsequent day it continued to function.

Bushehr, like all light water reactors, also requires 20 tons of lightly enriched uranium to be on the site at all times to expedite fueling operations that might be forced by safety-related shutdowns. This uranium also presents a danger; it can be used to accelerate an effort to make bomb-grade uranium. Estimates done for my center indicate that if this lightly enriched fuel was seized, technicians could quickly convert it into enriched feed, reducing the amount of effort needed to produce bomb-grade uranium by as much as fivefold, as compared to using natural uranium. So, instead of a year to make one bomb's worth in its 1,500-odd centrifuges, Iran could make a weapon's worth in about 7 weeks. It should be noted that North Korea is now asking that it be supplied with a large light water reactor in exchange for dismantling its plutonium production facilities.

Conventional wisdom, of course, has it that the IAEA could detect such diversions of fresh and spent fuel rods. Allowing that it might, our recent experience with North Korea and Iran suggest that the short notice that the IAEA's detections could conceivably afford—that would be 2 to 7 weeks—would hardly be sufficient to permit the world's key nations the time they would need to take decisive action. More important—and I want to emphasize this—under a number of scenarios, the IAEA might not detect these rods' theft at all. It's not generally known, but, for most of the nuclear facilities it inspects, the IAEA simply does not know, day-to-day, if its remote cameras and monitors are on.

Not long ago, the IAEA assessed this vulnerability. It learned that over the previous 6 years there had been camera blackouts that lasted, "more than 30 hours" on at least 12 separate occasions. What's worse, the IAEA learned of these blackouts only after inspectors went to the sites and downloaded the camera recordings,

as they are required to do every 90 days. During these blackouts, entire fuel rods could be removed and replaced with dummy rods. Within 90 days, a state could possibly convert this material into bomb fuel.

The study also discussed several other diversion scenarios. All of them—I repeat, all of them—were subsequently validated by the State Department, the National Weapons Laboratories and officials working on the safeguards advisory panels to the IAEA.

I am not going to get into any of the recommendations, to observe the 5-minute period. But I do think there is one that does deserve attention. One of these recommendations is made in "Falling Behind: International Scrutiny of the Peaceful Atom," a major report by the Center on the IAEA Nuclear Safeguards System, which I'm releasing today and ask be placed in the record. I should note that this study took 2 years, and was backed by the Carnegie Corporation of New York, and involved officials from many countries, and IAEA officials, as well.

In any case, one of the recommendations that I suggest be taken was briefed to the scientific advisor to Mr. ElBaradei, and that is that the United States take the lead in supplementing current IAEA contributions with what I would describe as a safeguards user fee. I believe this can be done incrementally, starting with how the United States formulates its own current voluntary contributions. A fee ultimately would be based on a percentage of the costs associated with the production of civilian nuclear energy, so you would not have this enormous gap and constant negotiations over whether or not to increase the IAEA's safeguards budget.

I will end there, because I want to observe your rule about 5 minutes. So, I'll stop right there.

[EDITOR'S NOTE.—The report submitted for the record by Mr. Sokolski was too voluminous to include in the printed hearing. It will be maintained in the permament record of the committee. It can also be accessed on line at: http://www.acamedia.info/politics/nonproliferation/references/cochran—2007.pdf.]

[The prepared statement of Mr. Sokolski follows:]

PREPARED STATEMENT OF HENRY SOKOLSKI, EXECUTIVE DIRECTOR, THE NONPROLIFERATION POLICY EDUCATION CENTER, WASHINGTON, DC

Mr. Chairman, Senator Lugar, members of the committee, I want to thank you today for giving me an opportunity to testify on the dangers the United States and other countries may face if, as some predict, civilian nuclear energy spreads to a large number of additional countries.

We like to think that the peaceful and military atoms are distinct and divisible from one another. In fact, they are not.

A detailed study done for my center in 2004 by an experienced U.S. nuclear bombmaker, a veteran nuclear safeguards expert, and a former U.S. Nuclear Regulatory Commission commissioner spelled out the military diversion dangers associated with civilian nuclear energy. Their analysis speaks to many cases, including Iran and North Korea.

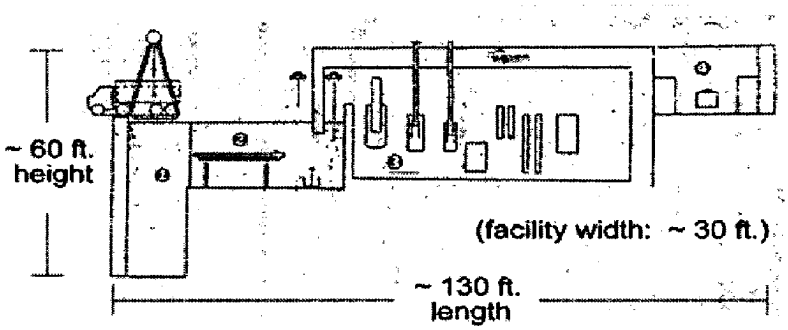
Tehran is building a large light water power reactor at Busheir. When completed and online, this plant will make 330 kilograms of near-weapons-grade plutonium in the first 12 to 15 months of operation. This is enough material to make 40 to 65 crude nuclear weapons. To extract such material from the reactor's spent fuel, which is expected to remain in Iran for at least a year or more, Iran would need only to build a relatively crude chemical extraction plant that could be as small as 30 feet by 130 feet by 65 feet (see Figure IV). Such a plant would be easy to hide. It could be built in roughly 6 months and could be kept on the ready until needed. Once

it began operating, though, this plant could produce a bomb's worth in as little as 10 days and one bomb's worth for each subsequent day it continued to function.

Figure IV

Simple, Quick Reprocessing Plant Designed to Make As Many as 20 Bombs a Month (Ferguson-Culler)

10-day startup, 1 bomb's-worth-a-day production rate



The Busheir reactor, like all light water reactors, also requires one-third of a fuel loading—approximately 20 tons of lightly enriched urarnium—to be available at the site at all times. This fuel is needed to expedite refueling operations; both those that are routine and those that might be forced by a safety-related shutdown of the plant. This lightly enriched uranium, however, presents a danger: It can be used as feed material to accelerate an enrichment effort to make bomb-grade uranium.

The estimates done for NPEC indicate that if this fresh fuel was seized, technicians would quickly cut open the fuel cladding, crush the ceramic fuel pellets inside, heat the material, and run hexaflouride gas over it to produce lightly enriched uranium feed. This enriched feed, in turn, could be used to reduce the amount of effort needed to produce highly enriched uranium by as much as five-fold over using natural uranium. Instead of taking a year to make one bomb's worth of highly enriched uranium in its 1,500 odd centrifuges, Iran could get a bomb's worth in as little as 7 weeks. North Korea, it should be noted, is now asking that it be supplied with a large light water reactor in exchange for dismantling its plutonium production facilities at Yongbyong.

Conventional wisdom, of course, has it that the International Atomic Energy Agency (IAEA) could detect such diversions of fresh or spent fuel rods. Allowing that it might, the agency's experience, though, with North Korea Iran suggests that it would be unreasonable to expect that the notice that such detections could afford—2 to 7 weeks—would be sufficient to rally the world's key nations to take decisive action.

Perhaps even more worrisome is that under a number of scenarios, the IAEA might not detect the theft of these rods at all. It's not generally known, but for most of the nuclear facilities it inspects, the IAEA simply does not know day to day if its remote cameras and monitors are on. Not long ago, the IAEA assessed this vulnerability and learned that over the previous 6 years, there had been camera "blackouts" that lasted for "more than 30 hours" on at least 12 separate occasions. The IAEA learned of these blackouts, moreover, only after inspectors went to the sites and downloaded the camera recordings as they are required to do every 90 days. During these blackouts, entire fuel rods could be removed and replaced with dummy rods. Within 90 days, a state could possibly convert this material into bomb fuel or come close to doing so. The study also discussed several other diversion scenarios. All of them were subsequently validated by State Department, national weapons laboratory, and IAEA advisory officials.

The good news is much can be done to correct this problem with the deployment of additional near-real time surveillance capabilities. Full deployment of such systems, however, costs money that the IAEA currently lacks. This funding gap is only likely to increase if, as predicted, more nuclear powerplants are built in new locations. Thirty-one states currently operate large nuclear reactors or fuel making plants. In just the last 18 months, 15 more—Algeria, Bangladesh, Saudi Arabia, Yemen, Egypt, Libya, Algeria, Morocco, Tunisia, Turkey, Australia, Indonesia, Vietnam, Kazakhstan, Nigeria—have announced plans to build fuelmaking plants or large reactors before 2020.

One of the recommendations made in NPEC's IAEA safeguard report, which I am releasing today and ask be placed into the record, is that the United States take the lead supplementing current IAEA contributions with a safeguards user fee. This might be done through several incremental steps leading to imposition of a fee on each IAEA member. The fee would be based on a percentage of the costs associated with the production of civilian nuclear energy and the operation of fuel making plants in each member state.

A second type of safeguards challenge NPEC investigated is the difficulty the IAEA has inspecting nuclear fuelmaking plants. As the IAEA's director general has made clear, once a country has nuclear weapons usable fuels, such as highly enriched uranium and separated plutonium, there is little the IAEA can do but hope that the country doesn't decide to make bombs.

The dangers relating to nuclear fuelmaking, however, go much deeper. First, the plants themselves can be diverted to make bombs overnight. Second, the nuclear weapons usable materials these plants make or handle—e.g., separated plutonium in the case of reprocessing and mixed oxide fuelmaking plants—cannot be accounted well enough to prevent the possible "loss" or diversion of many bombs' worth of material each year. It is projected, for example, that the IAEA will have to report nearly 50 crude bombs' worth of separated plutonium to be "material unaccounted for" (or MUF) each year Japan's latest large, commercial reprocessing plant is fully operational. Similar, worrisome MUF and inspection gaps are also possible at enrichment and certain fuel fabrication plants. Finally, the IAEA keeps secret how much nuclear material each country has by type that would be directly usable to make bombs. Instead, it only makes the global aggregates public, claiming that this information is commercially proprietary.

These practices have long been tolerated. This is a mistake. One of the key recommendations my center's report makes is to get the IAEA to distinguish much more clearly between what the agency can only monitor and what it can inspect in a manner that will reliably detect military diversions before they are completed. Only the later fulfills the IAEA's official definition of what a safeguard is. Making this distinction more clearly between what can be monitored versus what can actually be safeguarded is important. It certainly makes it easier to understand what the IAEA can and cannot safeguard and just how dangerous certain nuclear facilities are. Fuelmaking centers, including the one that might be built in Kazakhstan would stand out as being unsafeguardable as would the commercial reprocessing plant India is proposing to build solely to recycle U.S.-origin spent fuel.

It certainly would make sense to increase inspections at such plants but not because more inspections would meet the IAEA's official safeguarding criteria. Instead, such intensified monitoring would be useful to assure a greater chance of detecting diversions, at least, some time after they have occurred. It also would make sense to upgrade physical security at many of these sites to make them as stringent as the toughest security measures currently being implemented at nuclear weapons production and storage sites in the United States.

Finally, the United States and other members of the IAEA should reassess the key assumptions behind the IAEA's current timeliness detection goals. Just how much material does it take to make a bomb? How much time is needed to convert different key nuclear materials into bomb fuel? How often should the IAEA check against diversions of safeguarded materials? All of the current safeguarding premises were set nearly 30 years ago. Many of them are overly generous. It's time that they were updated.

Mr. Chairman, there are a number of other specific recommendations that the NPEC safeguards report makes that deserve this committee's attention. One is to clarify the benefits or lack of them relating to nuclear energy by getting the executive branch to implement title V of the Nuclear Nonproliferation Act of 1978. Under this provision, the executive is required to conduct analyses of what can be done to meet the energy needs of developing nations without fossil fuels or nuclear power. Unfortunately, it is something no President, Democratic or Republican, has yet chosen to do. There also are several recommendations to encourage states to act against those that engage in nuclear misbehavior.

What's encouraging is that none of these recommendations need wait upon consensus at the IAEA Board of Governors or the United Nations. Nearly all, in fact, can be acted upon by this committee.

Senator CASEY. Mr. Sokolski, thank you very much. And I have to apologize to you, I think I added at least one syllable to your last name when I pronounced it before, and I'm sorry about that. That's my fault. And I appreciate your testimony. And we'll have time during questions, I think, to amplify and to enlarge upon some of the recommendations which you lightly skipped over in the interest of time. Thank you.

Mr. SOKOLSKI. One syllable's not bad, actually. [Laughter.]

Senator CASEY. I've to admit it. Sorry.

Dr. Scheinman, you're next. Thank you.

STATEMENT OF DR. LAWRENCE SCHEINMAN, DISTINGUISHED PROFESSOR, JAMES MARTIN CENTER FOR NONPROLIFERATION STUDIES, MONTEREY INSTITUTE OF INTERNATIONAL AFFAIRS, WASHINGTON, DC

Dr. SCHEINMAN. Thank you, Mr. Chairman. It's a pleasure to be here, particularly with Senator Lugar, as the Monterey Institute has just stood up its Nunn-Lugar Chair in Nonproliferation. We're very pleased that that has come to pass.

I'll apologize for my voice. I am husky today.

Safeguards are a central feature of the nuclear nonproliferation regime and of the era introduced with President Eisenhower's Atoms for Peace Initiative in 1953. Their importance to a viable and effective international nonproliferation regime cannot be exaggerated. They are, for all intents and purposes, a condition sine qua non for cooperative development of civil nuclear energy and practicable international nuclear commerce. There is no identifiable acceptable substitute, short of some form of international ownership and control of the nuclear fuel cycle, a formulation advanced unsuccessfully by the United States in 1946, with the Baruch Plan. This approach is being revisited again today in the form of initiatives for multilateral, multinational fuel cycle arrangements, for enrichment and reprocessing, as the international community grapples with a number of challenges, ranging from the end of the cold war, the loss of disciplines imposed by the superpowers, the increasing spread of nuclear knowledge, diversification of sources of supply, the prospect of states and regions of tension developing capabilities that would put them in a position to quickly develop the nuclear weapon, and the rising threat of nonstate actors, including apocalyptic terrorists, acquiring nuclear explosives and the means to produce them.

Viable institutional arrangements, such as multinational enterprises, may provide additive stability and security, but safeguards are, and will remain, the core constituent of an effective and credible nonproliferation regime.

The traditional comprehensive safeguard system focused on verification of state declarations using quantitative measures supported by containment and surveillance. This system provided a high degree of confidence regarding the accountability of all declared nuclear material, but did not answer the question of whether undeclared nuclear activity might be present on the terri-

tory or under the control of a safeguarded state, although the system incorporated the principle that safeguards extended to undeclared activity, as well. This is a problem that we are grappling with today, and hopefully will be able to come to an effective solution, some elements of which are already on the table.

In the interest of time, let me come to the legislation on safeguards, in section 113—in the Senate bill 1138, and, in particular, section 104, Safeguards Technology and Development Program.

The provisions in section 104 are laudable and point in the right direction, but it reads as an unfunded mandate and, without the authorization and appropriation of resources, it cannot move forward at the level, and with the energy, necessary for there to be an impact on the safeguards system.

As I understand it, there's only a modest amount of research going on at the present time, although training and development continue. Twenty, even 15, years ago, substantial resources were deployed to national laboratories for research and development relevant to international safeguards. It has been said that, notwithstanding bilateral activities, with particular states, there has really not been significant relevant research activity in place here since the 1990s. Since that time, the technology made available to the IAEA has been based on research done earlier, and, if we were to continue, we would soon be transferring 20-year-old technology to new reactor and fuel designs, which is not a good idea.

The POTAS program does exist, this year with $14 million, and that is to provide assistance to the agency. But this isn't in the nature of research, but rather in the nature of transfer of things that already have been done.

The importance of timely and properly directed technology, research, and development can be seen, for example, in the case of the Japanese Rokasho Reprocessing Facility, which raises daunting challenges, in terms of verification. Here, the development and use of containment and surveillance, unattended radiation monitors, process monitors were necessary to keep tabs on the operation and integrity of the facility, and material accountancy alone certainly would not give us any kind of confidence that we could be counting on.

If the Congress is serious about this issue, as I am sure it is, then it needs to consider funded mandates, and call for a program of action, for technology development that engages the laboratories and the IAEA in an interactive relationship, wherein the agency identifies the needs and terms of its programmatic development, and the U.S. Government, through its laboratories, responds in a targeted way. It also should encourage the administration to develop a comprehensive plan, with coordinated and mutually reinforcing activity on the part of the agencies and departments that would be involved. Given our considerable stake in a strong and reliable nonproliferation regime and our historic leadership in the field, it's incumbent on the United States reestablishing its traditional leadership role to work to strengthen IAEA's safeguards to deal with current and future challenges arising from a potential significant rise in nuclear spread and use, flow and accumulation of nuclear materials, and the like. Compliance with treaty undertakings, which we have strongly asserted as an imperative need, is

a legitimate concern, and we are right to pursue it, but emphasis on providing the most effective tools for IAEA to meet its inspection goals is no less important. Our focus should be on considering how the United States can continue to help strengthen the IAEA safeguards system and prepare for future challenges by providing technology, tools, and expertise.

Thank you. Sorry I went over.

[The prepared statement of Dr. Scheinman follows:]

PREPARED STATEMENT OF DR. LAWRENCE SCHEINMAN, DISTINGUISHED PROFESSOR, JAMES MARTIN CENTER FOR NONPROLIFERATION STUDIES, MONTEREY INSTITUTE OF INTERNATIONAL STUDIES, WASHINGTON, DC

Safeguards are a central feature of the nuclear nonproliferation regime and of the era introduced with President Eisenhower's December 1953 Atoms for Peace initiative at the United Nations. Their importance to a viable and effective international nonproliferation regime cannot be exaggerated. They are for all intents and purposes a condition sine qua non for cooperative development of civil nuclear energy and practicable international nuclear commerce. There is no identifiable and acceptable substitute short of some form of international ownership and control of the nuclear fuel cycle, a formulation—based on the judgment of the Acheson-Lilienthal Report that a system of inspection superimposed on an otherwise uncontrolled exploitation of atomic energy by national governments will not be an adequate safeguard and could not ensure effective separation of civil and military uses of nuclear energy—advanced by the United States in 1946 at the onset of the nuclear age as the Baruch Plan. This approach is being revisited today in the form of initiatives for multilateral/multinational fuel cycle arrangements for enrichment and reprocessing as the international community grapples with the challenges raised by (i) the disappearance of the disciplines imposed on proliferation by the superpowers during the cold war; (ii) the increasing spread of nuclear knowledge; (iii) the diversification of sources of supply of nuclear materials, equipment, and technology including the emergence of a nuclear black market, which, according to recent reports appears to be alive and well; (iv) the prospect of states in regions of tension developing fuel cycle capabilities that puts them in a position to quickly proliferate if the political decision to do so is taken; and (v) the rising threat of nonstate actors including apocalyptic terrorists acquiring nuclear explosives or the means to produce them which was an important stimulant to the passage of U.N. Security Council Resolution 1540.

Viable institutional arrangements such as multinational enterprises may provide additive stability and security to international nuclear activity, but safeguards are and will remain the core constituent of an effective and credible nonproliferation regime. The statute of the IAEA, created as an outcome of Atoms for Peace was charged with two missions: To promote the peaceful uses of atomic energy, and to ensure, as far as it is able, that assistance provided by the agency, or under its supervision and control, not be used to further any military purpose. To this end the IAEA was authorized to establish and administer safeguards which it did over the course of the 1960s. That experience made it the logical choice to administer safeguards required by the 1968 NPT of all nonnuclear weapon states party to the treaty. Many of these states were prepared to forswear the acquisition of nuclear weapons and accept international safeguards on their peaceful nuclear activities, even though nuclear weapon states were not so required, but not prepared to accept an extension of that discrimination to the civil nuclear field, even for a limited time—hence the insistence on article IV providing for an "inalienable right" to develop nuclear energy for peaceful purposes; and for standing up a safeguards regime that minimized intrusion and maximized the opportunity to develop nuclear energy for peaceful purposes while at the same time standing the test of credibility and providing the necessary level of confidence regarding nonproliferation. Among their principal concerns were: Protecting proprietary and commercial interests such as being able to compete on equal footing with the weapon states in the civil nuclear marketplace, limiting the intrusiveness of onsite inspections (in particular capping the frequency of inspections), minimizing the discretionary authority of the international inspectorate, and protecting sovereign prerogatives in general.

The comprehensive safeguards system concentrated on the flow of nuclear material; limited onsite inspections under normal or routine circumstances to preagreed "strategic points" where inspectors could conduct independent verification activities, while providing for special inspections, which could be carried out anywhere in the

state, if the Agency were unable to meet its verification responsibility through routine inspections. Material accountancy, complemented by containment and surveillance, was the heart of the system based on a reciprocal obligation of the state and right and obligation of the IAEA to apply safeguards on all source and special fissionable material in all peaceful activities to verify nondiversion. In practice the emphasis on material accountancy during the 1970s and 1980s meant focused attention on the correctness of state declarations and less on whether the declarations were complete, and this became the culture of the inspectorate as time went on. It is important to bear in mind that in law, as distinguished from practice, safeguards extend to all nuclear material whether or not declared, and access to any place may be had under the IAEA's special inspection authority to verify full accountability.

From the 1970s until the North Korean situation in 1993, insofar as the traditional comprehensive safeguards system is concerned no diversion of nuclear material under safeguards was ever detected. However, the revelations in the wake of the 1991 gulf war of extensive undeclared nuclear activity and a significant clandestine nuclear weapons program in Iraq underscored the limitations of the safeguards system as it was practiced. In the wake of these revelations the Board of Governors, starting in 1992, took a number of decisions for which legal authority already existed including reaffirming the requirement that safeguards provide assurance about the completeness as well as the correctness of nuclear material declarations, reaffirming the right of special inspections (unfortunately with a caveat that it would be used rarely); environmental sampling at locations already accessible to inspectors, requiring states to present design information on new facilities or changes in existing facilities handling safeguarded nuclear material as soon as the decision to construct or modify is made (in lieu of the practice that developed that such information needed to be made 180 days before introducing nuclear material into a facility), introducing unattended and remote monitoring to detect movements of declared nuclear material, calling for voluntary reporting of imports and exports not only of nuclear material, but specified equipment as well, and using instruments and other techniques at strategic point to the extent present or future technology permits. Many of these measures relate to section 204 of the legislation before us.

Of equal if not greater significance was agreement on a model Additional Protocol granting new authority related to information a state is required to provide to the Agency and complementary access aimed at ferreting out undeclared nuclear materials or activities: With an additional protocol in place the IAEA is better positioned to draw statewide conclusions regarding whether all nuclear material and activities has been declared and placed under safeguards, leading to the ability of the IAEA to draw broader safeguards conclusions. It is a case of more information and more access leading to more comprehensive understanding of a state's nuclear status; it raises the level of confidence in one's conclusions about a state but it is not absolutely indisputable.

To summarize: The traditional comprehensive safeguards system focused on verification of state declarations using quantitative measures supported by containment and surveillance. This system provided a high degree of confidence regarding the accountability of all declared nuclear material but did not answer the question of whether undeclared nuclear activity might be present on the territory or under the control of a safeguarded state, although the system incorporated the principle that safeguards extended to undeclared activity as well as declared. The strengthened safeguarded system, which is statewide rather than facility-specific, builds out from that base and focuses on verifying not only the correctness of state declarations regarding nuclear material but also the absence of undeclared nuclear material and activities. To build a state nuclear profile the strengthened safeguard system puts much greater emphasis on qualitative measures including export and import information, on expanded declarations of nuclear and nuclear-related activities in the state, and on information analysis supported by environmental sampling and quantitative indicators. As well, it provides broader access for inspections of declared and undeclared activities. Greater access to information and broader access to sites and locations in the state are accompanied by access to the UNSC in the event of noncompliance with safeguards undertakings. On its face the Additional Protocol, in conjunction with measures adopted earlier by the Board of Governors provides the basis for a robust verification system based on a comprehensive picture of a safeguarded state's nuclear fuel cycle, inventory of nuclear materials, material production capabilities, nuclear-related infrastructure, and overall nuclear activities. The AP with its significantly increased information base and right of access, when fully implemented, offers greater transparency of nuclear assets and nuclear cooperation and a correspondingly greater insight into plans and intentions of safe-guarded states and to this extent contributes to increased credibility of and confidence in verification regime. An often overlooked caveat to this rather sweeping conclusion

is that even under the comprehensive safeguards system rights of ad hoc inspections and special inspections where conditions warrant it provide significant access to locations anywhere in the state.

The strengthened safeguards system is a work in progress in several respects. The legal and technical requirements have been identified and agreed upon, and the foundations for both have been or are being put in place. Much remains to be done on both counts. For example 31 states party to the NPT still have not signed safeguards agreements despite the obligation to do so within 18 months of adherence, and the Agency has not pressed those states to fulfill their obligations. Without a safeguards agreement there is no basis for carrying out verification activities. Many states with safeguards agreements have Small Quantity Protocols that absolve them from some of the obligations in comprehensive safeguards agreements but many of these have not put in place State Systems of Accountancy and Control which would provide the legal and administrative mechanism to take actions that would help the governments develop means by which to ensure against the risk of nonstate actors setting up shop in their jurisdiction and pursuing nuclear relevant activities without state knowledge that could undermine the regime.

State willingness to adopt and incorporate new verification technologies depends on a balance of considerations about effectiveness, intrusiveness, and expense. This relates to environmental sampling; remote and unattended monitoring devices; satellite imagery; and, if ultimately approved by the Board of Governors, wide area environmental sampling. For some it's a question of redistribution of resources relieving some of the effort devoted to material accounting which weighs most heavily on states with substantial nuclear activities, e.g., Canada and Japan.

This brings me to the legislation on safeguards in S. 1138, in particular Section 104: Safeguards Technology Development Program. The provisions in section 104 are laudable and pointed in the right direction. But it reads as an unfunded mandate and without the authorization and appropriation of resources it cannot move forward at the level and with the energy necessary for there to be an impact on the safeguards system.

As I understand it, there is only a modest amount of research going on at the present time although training and development continue. Twenty or even fifteen years ago substantial resources were deployed to national laboratories for research and development relevant to international safeguards. It has been said that notwithstanding bilateral activities with particular states there has not really been a significant research activity in place since the early 1990s. Since that time, technology made available to the IAEA is based on research done at that time and if that were to continue we would be transferring 20-year-old technology to new reactor and fuel cycle designs. Through the POTAS program assistance (this year on the order of $14 million) is provided to the Agency. The question is more one of how we, in the United States are organized and funded to keep at the cutting edge of technological developments that can be deployed when needed.

The importance of timely and properly directed technology research and development can be seen in the case of the Japanese Rokkasho reprocessing facility which raises daunting challenges in terms of verification. Here, the development and use of containment and surveillance, unattended radiation monitors, process monitors, were necessary to keep tabs on the operation and integrity of the facility; material accountancy alone would not yield results in which one would have great confidence. The same is true for Candu-type on load reactors where radiation monitors and camera system including real time monitoring systems are crucial to addressing timeliness issues, and hence the degree of confidence one can have in the safeguards applied at the facility.

A good deal of the influence that the United States has had on the safeguards system has come from the safeguards technology that we provided to the Agency; that has not been the case in recent years and others, such as France and Japan with their vibrant nuclear industries are gaining increasing influence in IAEA affairs according to some observers. To ensure that we do not lose our influence and that the safeguards system remains credible and effective we should recapture our earlier role in developing safeguards technology. The provisions in section 104 of the legislation point in the right direction; what needs to be done is to fund the base technical capability here in the United States that the IAEA has for many years been reliant. With the end of the cold war and downsizing of the U.S. weapons complex coupled and with the moribund state of civil nuclear activities in the 1990s, what used to be a robust R&D program diminished substantially, with only modest funding from diverse agencies and departments, and an apparent absence of overall coordinated strategy. Some have noted that at relevant national laboratories at the same time as retirements are taking place quality young staff members are moving away from international safeguards because they do not see pursuing it as leading

to a promising career. With the prospect of a surge of nuclear energy development in the years ahead involving new reactor and facility types implying a need for programs to address probable new challenges the trend line in our human and financial resource base is moving exactly in the wrong direction. Action and particularly commensurate resources need to be put behind well-meaning words.

So, the bottom line is that if Congress is serious about this issue, as I am sure that it is, then it needs to consider funded mandates and call for a program of action for technology development that engages the laboratories and the IAEA in an interactive relationship wherein the agency identifies needs in terms of its programmatic development and the United States Government, through it laboratories responds in a targeted way. It also should encourage the administration to develop a comprehensive plan with coordinated and mutually reinforcing activity on the part of the agencies and departments that would be involved. Given our considerable stake in a strong and reliable nonproliferation regime and our historic leadership in this field it is incumbent on the United States (bringing others in a position to do so along) to work to strengthen IAEA safeguards to deal with current and with future challenges arising from a potential significant rise in nuclear spread and use, flow and accumulation of nuclear materials, and the like. Compliance with treaty undertakings which we have strongly asserted as an imperative need is a legitimate concern and we are right to pursue it. But emphasis on providing the most effective tools for IAEA to meet its inspection goals is no less important. Our focus should be on considering how the United States can continue to help strengthen the IAEA safeguards system and prepare for future challenges by providing technology, tools, and expertise.

Senator CASEY. Thank you, Doctor. You were right on time. For this committee, that's perfect. Many examples of people going much, much further.

Next, and our final witness for this panel, Dr. McGoldrick. And appreciate your presence here, and your testimony.

STATEMENT OF DR. FRED McGOLDRICK, FORMER DIRECTOR OF NONPROLIFERATION AND EXPORT POLICY, DEPARTMENT OF STATE; BENGELSDORF, McGOLDRICK AND ASSOCIATES, LLC, WASHINGTON, DC

Dr. MCGOLDRICK. Thank you, Senator Casey, Senator Lugar. Thank you for the opportunity to testify on the bill sponsored by Senators Lugar and Bayh.

My testimony will primarily be on the fuel bank and fuel assurances, but I will be happy to take any questions on international safeguards.

As you know, a number of proposals have emerged, in recent years, offering nuclear fuel guarantees as an incentive to discourage states from acquiring their own enrichment and reprocessing facilities. I will address several questions, the answers to which are important if we are to devise feasible and effective methods to discourage the spread of these technologies.

The first question is: Why do states want to acquire uranium enrichment and reprocessing capabilities? Over the years, countries have sought such capabilities for a variety of reasons, to carry out entirely legitimate peaceful programs, for example, for energy security or management of nuclear waste. A few have sought such technologies in order to develop nuclear weapons or to acquire the option to do so.

The second question is: What policies has the U.S. Government employed in the past to dissuade states from acquiring their own enrichment and reprocessing plants, and how effective have they been? The concerns here are not new. During the 1970s, several countries sought sensitive nuclear technologies on the international

market. The United States is most successful in stopping the spread of these technologies when the countries in question were highly dependent upon the United States for their security or their nuclear supplies. The Republic of Korea and Taiwan are good examples. Where the United States had little leverage, it was unable to halt the efforts by countries determined to acquire such technologies. Argentina, Brazil, and South Africa are good examples.

In 1978, the members of the Nuclear Suppliers Group agreed, among other things, to exercise restraint in the transfer of sensitive nuclear technology. Since the establishment of the NSG, to my knowledge, major suppliers have made only a small number of transfers of reprocessing and enrichment technology for civil projects, and these have taken place openly and legally, and have been made to states that already possessed enrichment and reprocessing capabilities.

However, countries such as Iran, Iraq, North Korea, and Pakistan have been able to obtain enrichment and reprocessing technology on the international market by using surreptitious and illegal methods of procurement. U.S. efforts, from the 1970s to the present, to prevent the spread of such technologies, have had some effect in delaying and increasing the costs of the nuclear weapons program of some of these states, but, in most cases, they did not prevent these states from acquiring the equipment and technology they were seeking.

Finally, the United States made efforts to offer enhanced fuel assurances, such as the 1978 Nuclear Nonproliferation Act call for a international nuclear fuel authority, and U.S. initiatives, in the 1970s, for an international fuel bank. However, none of these fuel assurance initiatives were able to generate enthusiasm among suppliers or consumers at that time.

My third question is: What lessons can we draw from the past? First, enhanced fuel assurances are highly unlikely to have a direct impact on a country like Iran, who is determined to acquire such facilities for national security reasons. Second, an international fuel bank is not going to be a magic bullet. There are limitations to what nuclear fuel guarantees can do to prevent the spread of sensitive nuclear technologies. Third, an international fuel bank can be only one tool among several that the United States and other suppliers will need to deal with this problem. The United States will also have to employ export controls, much improved intelligence capabilities, cooperation with other nuclear exporters, and political persuasion in order to discourage the spread of these technologies. Fourth, they can help deprive states such as Iran and North Korea of a credible explanation for acquiring sensitive nuclear technologies under the cover of a peaceful nuclear program. They will also establish an international norm that most countries have no need to develop their own enrichment and reprocessing facilities. And it's important to note, in this connection, that several states in the Middle East have recently announced that they are giving serious consideration to the initiation of peaceful nuclear programs.

The establishment of a nuclear fuel bank could play an important role in helping to eliminate any justification for these coun-

tries to acquire their own sensitive technologies, particularly in an area as volatile as the Middle East.

In the interest of time, I will just list a few brief attributes of an international fuel bank.

First of all, I think the Congress needs to enact legislation in support of an international fuel bank, and it should emphasize that the United States is offering incentives to states, not requiring them to renounce their rights—what they regard as their rights—under article IV of the NPT.

A bank should also serve as a supplier of last resort, since the principal mechanism for providing adequate assurances of nuclear fuel should be a competitive market. It also should be structured so as to avoid destabilizing the market. It should be modest in size. It should be able to respond to sudden interruptions in a prompt and reliable manner, and would, therefore, have to employ an agreed set of predetermined release criteria. It will also have to take into account the nonproliferation requirements of suppliers, including the guidelines of the Nuclear Suppliers Group and, in the case of U.S.-origin material, the requirements of the Atomic Energy Act.

Finally, active U.S. support will be crucial for the establishment of an international fuel bank. And I, therefore, strongly endorse the legislation introduced by Senators Lugar and Bayh.

[The prepared statement of Dr. McGoldrick follows:]

PREPARED STATEMENT OF DR. FRED MCGOLDRICK, BENGELSDORF, MCGOLDRICK AND ASSOCIATES, LLC, WASHINGTON, DC

Thank you for the opportunity to testify on S. 1138, a bill sponsored by Senators Lugar and Bayh, to enhance international safeguards and to provide assurances of nuclear fuel to countries that forgo certain fuel cycle activities. My remarks will focus primarily on proposals for strengthening nuclear fuel guarantees, especially an international fuel bank, but I will touch briefly on the importance of increasing financial support to the safeguards system of the International Atomic Energy Agency (IAEA).

IMPROVES FUEL ASSURANCES

Enrichment and reprocessing technologies present risks of proliferation since they provide states with materials that are directly usable in a nuclear weapon or a nuclear explosive device. In recent years a number of proposals have emerged offering nuclear fuel guarantees as an incentive to discourage states from acquiring their own enrichment and reprocessing facilities. These include:

- IAEA Director General ElBaradei's suggestion to place all enrichment and reprocessing facilities under some form of multinational auspices or control.
- President Bush's proposal that (a) the world's leading nuclear exporters should ensure that states have reliable access at reasonable cost to fuel for civilian reactors, so long as those states renounce enrichment and reprocessing, and (b) the members of the Nuclear Suppliers Group (NSG) should refuse to sell enrichment and reprocessing equipment and technologies to any state that does not already possess full-scale, functioning enrichment and reprocessing plants.
- A proposal by the six states that currently possess commercial uranium enrichment facilities for a multilayered nuclear fuel assurance scheme.
- President Vladimir Putin's proposal for an international fuel cycle center in Russia.
- Germany's suggestion for establishing an enrichment facility on international territory administered by the IAEA.
- A proposal by the United Kingdom for the use of enrichment bonds that would involve agreement among supplier states, recipient states, and the IAEA to cope with supplier disruptions not related to nonproliferation considerations.
- A Japanese proposal calling upon states that supply uranium and enrichment service to register with the IAEA in order to supply nuclear fuel through the

IAEA to countries that suffer a disruption in supply not related to their nonproliferation obligations.

- A U.S. proposal to establish a strategic reserve of 17.4 tons of highly enriched uranium that will be blended down to help qualified states deal with any disruptions in their nuclear fuel supply.
- A proposal by the Nuclear Threat Initiative (NTI) for the establishment of an international fuel bank under the auspices of the IAEA that would serve as a supplier of last resort. Legislation has been introduced in both the House and the Senate that would provide U.S. Government funding for such a bank.
- The U.S. Department of Energy's Global Nuclear Energy Partnership (GNEP) under which the supplier states would offer so-called "cradle-to-grave" fuel cycle services by, for example, leasing enriched uranium to consumer nations that do not have enrichment and reprocessing facilities and taking back the used fuel that produced as a result of irradiation in reactors.

Having labored in the trenches of the nonproliferation field for 34 years, I believe we should evaluate proposals such as these from a very pragmatic point of view, and with our feet planted firmly on the ground.

With that spirit in mind, I will try to answer several questions.

The first is: Why do states want to acquire uranium enrichment and/or reprocessing capabilities?

The second is: What policies has the U.S. Government employed in the past to discourage states from acquiring their own enrichment and reprocessing plants, and how effective have these policies been in thwarting the spread of sensitive nuclear technologies?

The third is: What lessons can we learn from the efforts of various countries to acquire enrichment and reprocessing technologies and the corresponding policies of the United States to prevent the dispersion of such technologies?

The fourth question is: Will our current offers of improved fuel assurances enhance or hurt our chances to prevent the spread of sensitive nuclear technologies.

Fifth and finally: What approach will most likely maximize our chances of advancing the nonproliferation objective of minimizing the dispersion of enrichment and reprocessing capabilities?

I believe the answers to these questions are important, if we are to deal with this issue realistically and if we are to devise feasible and effective methods to discourage the spread of sensitive nuclear technologies.

Let me then begin by attempting to answer the first question.

Why do states seek enrichment and reprocessing capabilities?

Over the years, several countries have sought such capabilities for a variety of reasons—to carry out entirely legitimate, peaceful programs, to remove doubts about the reliability of fuel supply from foreign sources, to conserve nuclear fuel resources through reprocessing, to improve the management of their nuclear waste problems, to achieve the prestige of possessing advanced, sophisticated fuel cycle facilities, and to sell enrichment or reprocessing services on the international market. Still others sought enrichment or reprocessing technologies as a symbol of national achievement or as an important component of their national security. Some states made a decision to construct domestic enrichment and reprocessing facilities even though they could have availed themselves of less costly means of purchasing external enrichment or reprocessing services from abroad to meet their civil nuclear needs. A few states have sought such technologies in order to develop nuclear weapons or to acquire the option to do so. Some have used ostensibly civil sensitive nuclear facilities as a cover for a nuclear weapons program.

What policies has the U.S. Government employed in the past to discourage states from acquiring their own enrichment and reprocessing plants, and how effective have these U.S. policies been in thwarting the spread of these sensitive nuclear technologies?

U.S. concerns about the spread of reprocessing and enrichment capabilities are not new. In the mid-1970s the United States became alarmed that some major nuclear exporting states were planning to transfer enrichment and reprocessing technology to South Korea, Taiwan, Pakistan, and Brazil. France was seeking to sell reprocessing technology to Pakistan and South Korea and Germany was planning to sell reprocessing and enrichment technology to Brazil. These were developing countries whose small nuclear programs did not justify these expensive technologies. Some of them faced severe national security threats or had apparent ambitions to acquire nuclear weapons.

The United States was most successful in stopping the spread of sensitive nuclear technologies during the 1970s when countries such as the Republic of Korea and Taiwan were highly dependent on the United States for their security and for nuclear supplies. In a few cases the United States was able to convince the suppliers to halt the transfer of reprocessing technology because of the proliferation risks they involved. It failed to do so in other cases, e.g., the Federal Republic of Germany proceeded with the supply of enrichment and reprocessing technology to Brazil despite U.S. protestations.

Where the United States had little leverage, it was unable to halt the establishment of enrichment or reprocessing plants by countries determined to acquire such technologies. Argentina, Brazil, and South Africa are good examples.

In response to this problem and to the Indian nuclear test of 1974, the United States took the initiative with other major nuclear exporters to form the Nuclear Suppliers Group (NSG). In 1978, the members of the NSG adopted specific guidelines for the export of nuclear materials, equipment, and technology. Under these guidelines the NSG members agreed, among other things, to exercise restraint in the transfer of sensitive nuclear facilities, technology, and weapons-usable materials. They also agreed to encourage recipients to accept, as an alternative to national plants, supplier involvement and/or other appropriate multinational participation in sensitive nuclear facilities. In subsequent amendments to the guidelines, suppliers also agreed to authorize the transfer of nuclear materials, equipment, or related technology only when they were satisfied that the transfers would not contribute to the proliferation of nuclear weapons or other nuclear explosive devices. Thus the members of the NSG already exercise considerable restraint in the transfer of sensitive nuclear technologies.

To my knowledge, since the establishment of the NSG major suppliers have made only a small number of transfers of reprocessing and enrichment technology for civil projects by the major suppliers, and these have taken place openly and legally and have been made to states that already possessed enrichment or reprocessing capabilities.

However, countries such as Iran, Iraq, North Korea, and Pakistan have been able to obtain materials, equipment, and technology related to enrichment and reprocessing on the international market by using surreptitious and illegal methods of procurement. They were often able to obtain such items from states that did not have adequate export control laws. In addition the A.Q. Khan network was successful in the clandestine transfer of enrichment technology to the DRPK, Iran, and Libya.

The United States made concerted efforts from the 1970s to the present, using intelligence sources, export controls, and the cooperation of other suppliers to prevent countries such as Pakistan, Iran, Iraq, and North Korea from acquiring items on the international market to furbish their enrichment and reprocessing programs. These efforts had some effect in delaying and increasing the cost of the nuclear weapons programs of some of these states, but in most cases did not prevent these states from acquiring the equipment and technology they were seeking when they were determined to do so.

Finally, the United States also made efforts to offer enhanced fuel guarantees to discourage the spread of enrichment and reprocessing capabilities. These included Congress's attempts in the Nuclear Non-Proliferation Act of 1978 to promote an International Nuclear Fuel Authority, and U.S. initiatives to win support for an international nuclear fuel bank during the 1970s and 1980s. However, none of those fuel assurance initiatives were able to generate enthusiasm among other suppliers or consumers. Based on the reactions of states and nuclear utilities from the 1970s and 1980s to the idea of backup nuclear fuel supply arrangements or an international fuel bank, one should not be surprised if the idea of establishing new fuel assurances schemes meets with some indifference. One of the reasons is that commercial markets for nuclear supply and the contractual system on which such markets are based have generally worked satisfactorily in terms of assurance of supply. At the present time, the global enrichment market is operating in a relatively smooth fashion and competition among several enrichment companies has provided a source of security for importing states.

What lessons can we learn from the efforts of various countries to acquire enrichment and reprocessing technologies and the corresponding policies of the United States to prevent the dispersions of such technologies?

The history of this issue should enable us to draw certain lessons.

First, it is doubtful that several of these states would have been prepared to relinquish an independent fuel cycle capability, including small-scale facilities, even if they had been offered guarantees of nuclear fuel, or if they had opportunities to participate in multinational fuel cycle facilities. In several instances the availability of

reliable external sources of supply was irrelevant to the decisions of some countries to acquire enrichment and reprocessing. Such states are likely to be reluctant to forswear irrevocably enrichment or reprocessing capabilities even if they are offered attractive nuclear supply assurances from other countries or participation in multinational enrichment and reprocessing facilities.

If states are determined to acquire enrichment and/or reprocessing facilities for military purposes, they will do so for what they perceive to be compelling national security reasons, and they most likely will not be willing to alter their policy because the United States and/or other nuclear exporting states offer improved nuclear fuel assurances. Enhanced fuel assurances and opportunities to participate in multinational fuel cycle facilities are unlikely to have a direct impact on countries such as Iran and North Korea.

Second, nuclear fuel assurances are not going to be a magic bullet. There are limitations to what fuel guarantees or participation in multinational fuel cycle services can do to prevent the spread of sensitive nuclear capabilities.

Third, fuel assurances such as an international nuclear fuel bank can be only one tool among several that the United States and other suppliers will need to employ in order to encourage other states to refrain from acquiring their own national sensitive nuclear facilities. The United States will also need to utilize a range of policy initiatives, such as export controls, much improved intelligence capabilities, cooperation with other nuclear exporters and political persuasion in order to discourage the spread of enrichment and reprocessing plants.

Fourth, effective fuel guarantees could help establish global nonproliferation norms for the nuclear fuel cycle that would help remove excuses for countries to pursue their own enrichment and reprocessing facilities. In particular, they can help deprive states such as Iran and North Korea of a credible explanation for acquiring sensitive nuclear facilities under the cover of a peaceful nuclear program when their intent is use such technologies for nuclear weapons. They would also help establish a norm that the vast majority of countries have no need to develop their own national indigenous enrichment or reprocessing capabilities. In this connection, it is important to note that several states in the Middle East have recently announced that they are giving serious consideration to the initiation of peaceful nuclear programs. If these countries proceed with civil nuclear programs, they are likely to be small and restricted to one or two research or power reactors for the foreseeable future. It would make no economic or programmatic sense for these countries to acquire either enrichment or reprocessing plants. Moreover, the presence of these sensitive nuclear technologies in such a politically volatile area would only threaten regional stability. I believe the establishment of an effective fuel assurance scheme such as an international fuel bank could play an important role in helping to eliminate any justification for the countries in this region to acquire their own enrichment and reprocessing facilities.

Will our current offers of improved fuel assurances enhance or hurt our chances to prevent the spread of sensitive nuclear technologies?

In answering this question it is imperative that we recognize the bargain that we made in negotiating the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), a bargain that was essential to the success of the negotiations and the entry into force of the treaty. Article IV of that treaty contained a basic understanding that, in exchange for forswearing the manufacture and acquisition of nuclear weapons and accepting IAEA safeguards on all their peaceful nuclear activities, nonnuclear weapon-states party to the treaty would be assured the right to obtain the full benefits of the peaceful uses of nuclear energy. In addition, the bargain included the commitment by the advanced nuclear powers to assist the peaceful nuclear programs of other parties, with special attention to the needs of developing countries.

Unfortunately, the language that the Bush administration initially used in offering improved fuel assurances has produced a regrettable reaction from many nonnuclear weapon states. For example, the President's February 11, 2004, speech proposed improved fuel assurances only to states that renounced enrichment and reprocessing plants. John Bolton, then-Under Secretary of State for Arms Control and International Security gave a speech to the NPT Preparatory Conference in 2005 in which he said that, "The Treaty provides no right to such sensitive nuclear technologies."

The reaction of many nonnuclear weapon-states parties to the NPT to these statements was sharply negative. Nonnuclear weapon states warned against establishing a new discriminatory nonproliferation regime that would be inconsistent with the provisions of article IV of the NPT.

For example, the Non-Aligned Movement submitted a working paper to the 2005 NPT Review Conference making clear that the members of this group intended to defend their rights under article IV of the treaty. It stated,

> The Group of Non-Aligned States Parties to the Treaty continues to note with concern that undue restrictions on exports to developing countries of material, equipment and technology for peaceful purposes persist. In this regard, the Group believes that any undue restrictions or limitations on peaceful uses of nuclear energy, incompatible with the provisions of the Treaty, should be removed.
>
> In this regard, we recall that the NPT fosters the development of peaceful uses of nuclear energy by providing a framework of confidence and cooperation within which those uses can take place. It is in this context that we reaffirm the inalienable right of the States Parties to the NPT to engage in research, production and use of nuclear energy for peaceful purposes without discrimination and that free and unimpeded and nondiscriminatory transfer of nuclear technology for peaceful purposes be fully ensured.

At the May 2007 Preparatory Committee for the 2010 NPT Review Conference, the spokesperson for the NAM emphasized that "access to equipment, material, and technology for civilian purposes should not be restricted." South African representative Abdul Minty highlighted the concerns of many consumer states about the proposals by the United States that would restrict improved fuel assurances only to those countries that renounce enrichment and reprocessing plants. "With regard to current discussions on the fuel cycle, it is imperative that we do not create another kind of cartel that would exclude full participation, particularly by States in full compliance with their safeguards obligations. We wish to recall that nothing in the NPT shall be interpreted as affecting the inalienable right of all Parties to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I, I and III."

NPT parties may find it particularly exasperating that the U.S. proposal appears to acquiesce in the reprocessing and enrichment programs of non-NPT parties such as India, Israel, and Pakistan simply because they already possess such facilities while denying such capabilities to NPT parties that are in full compliance with their treaty obligations.

A representative of Argentina has recently made it clear that the right to nuclear technology goes beyond article IV of the NPT and goes to the rights of states as sovereign entities.

In addition, some states have seen the Department of Energy's Global Nuclear Energy Partnership (GNEP) as a program that aims to create a new discriminatory regime that would divide the world into two classes of states: "So-called fuel cycle states," which would be allowed to have enrichment and reprocessing facilities and so-called "reactor states" which would not be allowed to have such technologies.

The result of this approach as well as the language used by the Bush administration requiring states to renounce enrichment and reprocessing or denying that states have to rights to such technologies has already backfired to some extent. Several states, including Argentina, Australia, Brazil, Canada, Kazakhstan, Ukraine, and South Africa have made it clear that, while they might not require an enrichment capability in the immediate future, they are not prepared to forswear their rights to do so.

Thus the Bush administration's rather inflexible and unbending language in laying out its requirements for states to qualify for fuel assurances did not get off to a very auspicious start.

What approach is most likely to maximize our chances to advance our objective of minimizing the dispersion of enrichment and reprocessing capabilities?

What is needed in my view is a much more sophisticated and deft approach to this issue. It is quite clear that article IV does not oblige NPT parties to engage in nuclear cooperation or to transfer sensitive nuclear technologies to any particular NPT party. Moreover, the United States has always believed that suppliers should withhold nuclear cooperation from any state that is pursuing a nuclear weapons program or is otherwise violating its nonproliferation obligations. The United States has long believed that there is no economic justification for the spread of enrichment and reprocessing to most countries. The vast majority of NPT parties have not sought enrichment or reprocessing for this very reason. Moreover, the United States has never supported the view that Parties to the NPT have an unfettered right to acquire enrichment and reprocessing plants.

However, the success of our efforts will depend critically on the language we use and the conditions we impose. If we demand that countries renounce what they re-

gard as the rights under article IV of the NPT or indeed their sovereign rights as states, we will face strong opposition. This suggests that the United States and other supplier countries may not wish to insist that states forgo for all time what they regard as their right to acquire enrichment and reprocessing plants, but instead offer fuel assurances or cradle-to-grave benefits to those countries that have no perceived interest in acquiring sensitive fuel cycle facilities or that have agreed voluntarily to forgo such facilities.

In this connection, I have been encouraged by less inflexible statements from the administration on this issue.

For example, U.S. Special Envoy for Nuclear Nonproliferation Robert G. Joseph gave a press conference recently that seemed to back away from the rigid position of earlier statements and place stress on the voluntary nature of countries' decisions to forgo enrichment and reprocessing. He said, "And finally, I would emphasize that this is not about the rights of countries under the NPT. This is not about changing or taking away rights. This is about encouraging sovereign states to make sovereign choices based on their own interests, financial as well as nonproliferation interests. It's about providing an alternative path to energy development that becomes a win for energy security, a win for environmental security and a win for nonproliferation."

It remains to be seen whether the administration will demonstrate any new flexibility in its approach to this issue, or whether it will stick to its rigid requirements for renouncing enrichment and reprocessing as a condition for receiving improved fuel assurances

In any event, a certain amount of damage has already been done. This makes it all the more important that the legislation enacted by Congress in support of an international fuel bank avoid language that challenges the article IV rights of NPT Parties or requires them to forgo such rights. Rather, I believe any new legislation in support of an international fuel bank should emphasize that the United States is offering incentives to states, not requiring them to renounce what they regard as their fundamental rights. Incorporating such a positive approach in U.S. law will be giving legal force to U.S. policy and is more likely to win acceptance with other countries than a policy of denial. The formulation used in Senate bill S. 1138 requires that fuel from an international fuel bank should go to countries that "decide to forgo a national uranium enrichment program and spent nuclear fuel reprocessing facilities." Presumably this means a voluntary decision. The House bill H.R. 885 specifies, among other things, that a recipient of fuel from an international fuel bank, "does not possess uranium enrichment or spent-fuel reprocessing facilities of any scale." Either of these formulations is more likely to be acceptable to consumer states and therefore have a better chance of success than the approach initially taken by the Bush administration. In other words we need to make sure that we offer supply assurances to states that voluntarily choose to rely on the international market for their nuclear fuel requirements. No country should be asked or expected to give up or abridge any of their rights under the NPT.

Other attributes of a successful fuel assurance arrangement, such as an international fuel bank, that will help the chances of success in discouraging the spread of sensitive nuclear fuel cycle facilities include the following:

- The principal and preferred mechanism for providing for adequate assurances of nuclear fuel supply should be a competitive market. Any mechanism for offering improved fuel supply such as an international bank should serve as a supplier of last resort and should be structured so as to avoid destabilizing the market.
- An IAEA nuclear fuel bank should be designed to meet short-term supply interruptions that may occur in small countries that are unfamiliar with the workings of the international nuclear market. It therefore may only have to be modest in size. Moreover, a modest-sized bank is more likely to obtain the required financing than a large one and is not likely to be seen as a threat to the stability of the market.
- A nuclear fuel assurance arrangement or international fuel bank should be able to respond to sudden supply interruptions in a prompt and reliable manner. It should therefore employ an agreed set of predetermined release criteria which, when met, would automatically trigger fuel supplies to countries suffering an interruption in supply for reasons unrelated to their nonproliferation obligations.
- It will also have to take into account fully the nonproliferation requirements of suppliers. Presumably this would mean that the recipient would have to agree in advance to accept the export guidelines of the Nuclear Suppliers Group and, in the case of U.S.-origin material, the requirements of the Atomic Energy Act for peaceful nuclear cooperation.

Finally I believe that active U.S. support will be crucial for the successful establishment of a strengthened system of fuel assurances, including an international nuclear fuel bank, and I therefore strongly endorse the legislation introduced by Senators Lugar and Bayh.

GLOBAL NUCLEAR ENERGY PARTNERSHIP

Let me make a few comments on the Global Nuclear Energy Partnership because it contains an important component that is designed to discourage the spread of enrichment and reprocessing facilities. GNEP proposes that, if the United States and other supplier states can successfully demonstrate and commercialize advanced reprocessing and nuclear reactors, it should be more physically and politically feasible than it is today for supplier countries to lease nuclear fuel or to offer a spent-fuel take-back arrangements to consumer countries.

In my view, a "credible cradle to grave" fuel supply program by the United States and other suppliers may prove far more effective than some other techniques in discouraging the spread of enrichment and reprocessing facilities since it would relieve states of the burden of disposing of their own nuclear wastes.

However, none of the major fuel-cycle states, with the possible exception of Russia, appear to be in a position to offer such options to consumer states on any widespread basis. Moreover, the prospect of offering cradle-to-grave services appears to be several years, indeed possibly decades, away from being realized. In addition, the United States Government would face formidable public and congressional acceptance problems if it were to try to initiate a program to take back power reactor spent fuel. Most importantly, the inability of the U.S. Government to meet its responsibilities under Nuclear Waste Policy Act to take spent fuel off the hands of American utilities means that United States would have no credibility in offering a cradle-to-grave policy to foreign countries unless and until it can move to solve its own waste management problems.

SAFEGUARDS

Before closing, let me say a few words about the provisions in S. 1138 for providing financial support to the IAEA's Safeguards Analytical Laboratory (SAL). I strongly support the United States providing $10 million to the Safeguards Analytical Laboratory, and I hope the other Member States of the Agency will come forward with voluntary contributions to add another $10 million to bring the laboratory up to snuff. This laboratory has a lot of equipment that is antiquated, and the Agency must rely on a very small number of external laboratories for analyses of environmental samples. The IAEA needs additional as well as new types of equipment for conducting its safeguards activities. The IAEA does not have a state-of-the-art lab for particle analysis, which has become an indispensable tool in determining the existence of undeclared enrichment or reprocessing activities.

Let me end by saying a few words about the overall budget for IAEA safeguards. Starting in the mid-1980s, Member States imposed a "zero real growth" budget on the IAEA. The Bush administration can take credit in leading the effort to increase financial support for the IAEA safeguards system in 2003. However, the IAEA's safeguards workload is likely to increase in the years ahead. The demands on the IAEA safeguards system are likely to increase as more countries turn to nuclear power. The Vienna Agency also will need to devote more resources to evaluating information supplied by Member States in connection with Additional Protocols to their safeguards agreements. In addition, the IAEA will have to verify the freezing, disablement, and dismantlement of the North Korean nuclear program. On June 15, 2007, the Director General of the IAEA, Mohamed ElBaradei, warned that Agency's "safeguards function is being eroded over time" and said he was "very distressed" by the failure of the Board of Governor's to approve a 4.8-percent funding increase for 2008.

I, therefore, hope that the United States will take the lead again in urging Member States to provide the resources the IAEA needs to carry out its vital safeguards mission.

Senator CASEY. Doctor, thank you very much for your testimony, and for all the testimony presented.

I'd ask that the prepared statement for each witness be entered into the record for purposes of amplifying the record.

Thank you very much, to each of you.

Let me ask a question, and I'll throw it out for all three, and you may all have the same answer. It's a true-or-false question. And it's

this, very simply: No country has ever successfully diverted nuclear material from a facility with IAEA safeguards. Is that true or false?

Mr. SOKOLSKI. False.

Dr. MCGOLDRICK. False.

Senator CASEY. And can you tell us why?

Dr. MCGOLDRICK. Well, there have been instances—a diversion is a violation of IAEA safeguards, and the IAEA has found Iraq in violation of the safeguards agreement; it has found Romania in violation of the safeguards agreement. I might add, in the case of Romania, Romania discovered this after the overthrow of the Ceausescu regime and volunteered the information. There have been other minor violations that the agency has discovered, such as in South Korea and Egypt, and perhaps a few others that I can't recall. But the fact is, there have been violations of IAEA safeguards. And, of course, Iran—I neglected to mention Iran, which has been found in violation of the safeguards agreements.

Senator CASEY. And, in light of that, the real worry that we have, among others, is that diversion. And how about the diversion of a very small proportion of nuclear material that a facility handles, such as the amount that collects in crevices between machine parts? I guess they call that "material unaccounted for," or MUF. Tell us about that, and tell us about the risks involved with that kind of even seemingly limited diversion. Any one of you, it doesn't——

Dr. MCGOLDRICK. Well, I wouldn't necessarily call what you have called a MUF a diversion. For example, a reprocessing plant consists of miles and miles of pipes and pumps and so on and so forth, and it is only normal that a certain amount of the material is going to get caught up and not flow through. And, in most cases, this is just—or is a result of the nature of the facility itself, and is not a deliberate diversion of nuclear material to nuclear weapons purposes. I think the IAEA has made efforts to try to minimize the MUF in each case, and the MUF is usually larger in cases like reprocessing and enrichment facilities, and therefore, requires more intensive safeguards.

But, in addition to the material accountancy control, the IAEA also has containment and surveillance methods, which is in addition to material accountancy, which helps, also, to prevent the diversion of nuclear material, in addition to material accountancy and control.

Dr. SCHEINMAN. I think it's important though, to understand that, in a large reprocessing facility, it is impossible for the agency to be able to detect the diversion of small quantities of material. It could be, kind of, tablespoons at a time, as we used to say. And, over time, it's very conceivable that, in a large reprocessing plant, sufficient quantities of plutonium could be diverted, and the agency would never actually have been able to catch that, because there's always a degree of uncertainty in any inspection activity, and if you're talking about the standard which we use, which is 8 kilograms of plutonium diverted to constitute the risk of a nuclear device being constructed, in a facility like the Rokkasho-mura plant, which is extremely large, no possibility at all that you could ever catch that small a degree of diversion. But, as Dr. McGoldrick just

said, if you're talking material accountancy, I would say you are skating on thin ice. If you're talking about the total capacity put in, material accountancy, yes, but containment, surveillance, real-time monitoring, cameras, et cetera, then you have a better chance of being able to lower that prospect that a successful diversion will take place. But, again, if you're getting down to very, very small quantities in a very large facility, that risk will always be there.

Senator CASEY. Thank you, Doctor.

Mr. Sokolski.

Mr. SOKOLSKI. I almost am tempted to say now for something entirely different. I don't think—I think we're edging toward the truth here. Let me push a little further.

If you turn to page 18 of the report that's part of the testimony that I asked be placed in the record, you're not talking about small quantities, you're talking about 50 bombs' worth per year, in the case of the Japanese reprocessing plant. I don't think that's small. I think that's a big number. If you are——

Senator CASEY. If you could explain that, when you say "50 bombs per year"; derived from what?

Mr. SOKOLSKI. They—when you do the calculations of what it is the IAEA itself admits it's going to have a statistical probability of not knowing about, given those crevices, solution, it comes out to be a rather large figure. Now, you're going to have the administration come up here, if they haven't already, and they're going to tell you, "Oh, we're going to safeguard the reprocessing plant that's going to be built in India," or you may find proposals to create big fuel centers that'll enrich, eventually, in Kazakhstan, and they'll say, "Oh, we're going to safeguard that." One of the key recommendations in the report that I'm releasing today is that the distinction needs to be made between what you can monitor—which is "look at"—and maybe, with enough effort, find out about diversions after they occur, and what you can safeguard, which the IAEA defines as being able to monitor in such a manner that you can detect a diversion before it occurs or is completed—I should say, before it's completed.

Now, in addition, one last comment, you focused on material unaccounted for. I think you need to also understand—and you might turn to page 14, because there's a nice graphic there—there's a big problem with material accounted for. One of the things the agency does not do is list publicly how much weapons-usable material is on hand that they need to safeguard, of which type, by country. They've refused to do this, I think, largely on the preposterous proposition that it's proprietary industrial information. If you take a look at this chart, you'll see that the amounts of those materials grew about sixfold over the last 20 years, but the IAEA's safeguards budget no more than doubled to account for that. That amount of nuclear weapons usable material is going to continue to grow as long as you keep propounding, with a fuel bank or not, that everyone has a right to make nuclear fuel. So, it may well be that you need to push your bank on the basis that you're not going to dictate to people that they can't make nuclear fuel, and you're not going to get into the question of rights. But the U.S. Government probably needs to have a position that doesn't say what it currently says, which is everyone has an absolute, unqualified right

to make nuclear fuel. Our position—right now, publicly by the State Department—is identical to that of the state of Iran. You're not going to win with a fuel bank if you keep saying that.

Senator CASEY. Just want to—before I turn it over to Senator Lugar—just for the record, you referred to page 18 in your report. And I just wanted you to tell us exactly what you're referring to there, so the record is clear, so if someone is reading——

Mr. SOKOLSKI. OK.

Senator CASEY [continuing]. The record, they don't have to go back——

Mr. SOKOLSKI. Well, in there——

Senator CASEY [continuing]. And find it.

Mr. SOKOLSKI [continuing]. There is a somewhat—reference, but detailed description of a report done—or, I should say, a study done for this report, by Dr. Ed Lyman, who used to run the Nuclear Control Institute. And what he lays out are the incidents of material unaccounted for, and what had to be done to finally come to some reckoning of what the figures were, in the case of several facilities in Japan and the United Kingdom. It is not a very flattering picture. It took years, as it's described on these pages, to know that, oh, my gosh, we don't know where several bombs' worth of material went in pilot facilities, small facilities. And the numbers get larger, the bigger the amounts are.

So, I really think that candor, sunlight, is very important here. I think we need to understand that when we're talking about what they call bulk handling facilities, facilities that make nuclear fuel or handle sensitive materials that are called "direct-use materials," like separated plutonium and highly enriched uranium, that what you're really talking about are factories and facilities that need to be viewed much like we view nuclear weapons plants and nuclear weapons storage facilities. They aren't. That's part of your problem.

Senator CASEY. Thank you. And I'm over time, so Senator Lugar has at least 10 minutes.

Senator LUGAR. Thank you, Mr. Chairman.

Dr. Scheinman, let me thank you again for being a member of our Policy Advisory Group that met over in S–116 in 2005 for a number of meetings and really formed the basis of understanding for the legislation that is before us today.

You've indicated your enthusiasm for the legislation, but let me ask you, and then each of the other distinguished panel members, What thoughts do you have about our legislation, how it compares with other proposals before Congress or the administration, and what, if anything, we should do to enhance what we've written?

Dr. SCHEINMAN. Well, Senator, in my initial comments, I remarked that what you've put forward here in this legislation with respect to section 104—or, is it 204? I'm not sure—relating to technology related matters, is a laudable thing to be proposing to do, but the problem is: Are we organized nationally to do it? Is there someone who has oversight, that will bring together the departments and the various services that might be tasking national laboratories to do certain kinds of activities, to pursue certain kinds of research? And do we have the resources there that will go to the laboratories in order to do this?

The laboratories have been fundamental to this, of course, over the many years, and, in the case of Los Alamos, which I, perhaps, know a little bit better than some of the other laboratories, many people who were in the business of research and development are now retiring. Younger people are looking at what their career path ought to be. And many of them have come to be concerned about whether they should get into research and development on safeguards and verifiability issues. Why? Because there's not much demonstration that there is a sound financial basis to take them forward. So, it strikes me that we have a double problem here: First the resources that would go into enabling us to get back into leadership positions with respect to research and development on things related to safeguardability and the like, and, second, having a cadre of young people who are prepared to put the next 20 or 25 years of their professional lives into this.

I understand that sometimes people will be deployed to the IAEA as inspectors. And they don't get welcomed back with the flags flying, they get allowed back, but no certainty about where they're going to be placed and what kinds of activities they'll be best deployed to.

So, these are problems that we have—personnel problems, financial problems, and the commitment, which I see in this legislation, to enable us to take leadership again. If you go to the IAEA now, you find that the French are all over the place, the Japanese are all over the place, getting their points in. What we need to do is to be able to get our points in. We have to do this with leadership. And leadership will require organization, on the one hand, and the resources necessary to carry things forward. And this is particularly the case in an era when we are talking about GNEP and new technologies, new facilities, new kinds of fuel cycles. We'd better be in the front line on this kind of an—of these questions in order to avoid some of the problems that Dr. Sokolski mentioned, that exist with respect to the current fuel cycle.

Senator LUGAR. Those are excellent suggestions.

Dr. McGoldrick, do you have some thoughts in this same area?

Dr. MCGOLDRICK. I would certainly echo Larry Scheinman's comments. I agree with them completely. I do think the safeguards laboratory is in desperate need of upgrading equipment, and I think what's particularly important is its particle analysis, which is essential to the detection of undeclared enrichment and reprocessing facilities. And so, I very much favor the efforts you're making to give the agency additional funds to get the right kind of equipment, advanced equipment, state-of-the-art equipment to do this kind of analysis.

Senator LUGAR. I think, likewise, I would just pick up the point that both of you have made about unfunded mandates and what have you. And this is a subject that I've raised earlier today. Our enthusiasm may wax and wane, but this is a situation that, sort of, goes on in an international setting, and the need for solid budgetary debate here, and some structure, probably, is of the essence if this is to have promise down the trail.

Dr. MCGOLDRICK. I would also add that the IAEA safeguards budget is really inadequate——

Senator LUGAR. Yes.

Dr. MCGOLDRICK [continuing]. For the agency to carry out its responsibility. I don't recall what the assessed budget is. It's someplace in the vicinity of $110 or $120 million. But, what does an F–16 cost compared to that? And what is the cost-benefit analysis comparing the two of them? I really think it is shameful, frankly, that the international community cannot come forward and finance the agency with the resources it needs to carry out its growing safeguards responsibility.

Senator LUGAR. Yes, Dr. Sokolski.

Mr. SOKOLSKI. I want to be careful here. I'm no doctor.

Senator CASEY. That's all right.

Mr. SOKOLSKI. I have——

[Laughter.]

Mr. SOKOLSKI [continuing]. A higher degree. It's called an ABD, "all but dissertation," and it's actually harder to get, because nobody tells you when you get it. [Laughter.]

First, let me say that I've already defended your legislation in the House, so, "I gave at the office." It's good stuff. I think it's good, for three reasons, and then I'm going to suggest ways you might think about improving it.

It's concrete, literally, in making a suggestion about the lab. It's kind of embarrassing, to the IAEA and to the Government, that Congress actually is doing its oversight job. You're not supposed to do that. That's point one. Take more trips, please.

Second, I think somebody had the presence of mind to actually say "market price"—"competitive market price." Don't drop that language. The last thing you want to do if you're concerned about Yemen building a large near-bomb factory is to have a loss leader in the form of subsidized fuel. It is the least expensive part of the life-cycle costs of a reactor, but—I can just see it now, just as, perhaps—I guess I'll try not to be sexist, so I'll use a male example—you go into Sears, and you get a free special tool if you buy $500 worth of tools you don't need. And so, you put your credit card down and you buy the whole kit-and-caboodle. When you start subsidizing fuel, that is what you're doing. It is a very counterproductive thing to do. Go with the market.

Second, I think it actually is a plus that there's no mandate for funding in your bill, and that you actually ask for a report. What a novel idea. Get some idea of what you're doing before you fund it. Now, this isn't the way the House wants to proceed. I would stick to your guns. You want the answers before you give the money over. And don't be rushed because of Iran. I mean, I think the testimony we've heard—Mr. McGoldrick laid out—is very good. It should be reread and rethought about. He made all the good arguments. Iran should not be the driver. And the idea that this Government, with—what is it, $3 trillion budget, should be worried about a $50 million private contribution over something this important, is mildly obscene. I mean, that can't be the argument. Take your time, get it right.

Now, two changes I would make, or think about.

First, OK, you don't want to dictate to people what you think the NPT says or doesn't say, or how they should think about that. But could you please at least repeat in your bill the language that you passed under the Hyde Act. You voted for it already. I'm not asking

you to do anything new, and it's in the House bill. Recede to their position, please. And what it states is, there is, in the view of the U.S. Government at least, not an inalienable per se right to any and all, or any particular, nuclear technology. It has to meet certain criteria to be peaceful.

Second—and here, I'm going out on a limb, but I actually think it's a great idea, so I'm going to say it—why not, if you're going to put money—more volunteer money for safeguards—come up with a formula that would say, "We're coming up with $10-million-plus, whatever it is, for POTAS and everything else, that's going to be based on a certain percentage of what our installed nuclear capacity in the United States is." It won't change the amount of money. It won't obligate you to do more. But it'll set the example that, somehow, if there's growth, and if there are people using nuclear power, part of the price of doing business, from here on out, will be to pay for safeguards. Now, you can start with this voluntary thing. It won't obligate you to do anything with regard to the bigger picture, but it might prompt a lot of interesting discussion. And I'd be happy to work with you on this, as would Tom Shea, who came up with the idea, who has more IAEA experience than, I don't know, probably this entire room times five. I recommend that you talk with him.

Anyway, those are the two things I would do to improve it. And I think it's pretty good. So, don't retreat on what's sound.

Senator LUGAR. Yes.

Dr. MCGOLDRICK. Oh, I'm sorry.

Dr. SCHEINMAN. Could I just add one thing? That the mil kilowatt hour produced by a nuclear power plant has been discussed, time and time again. It's a good idea, but it has never gotten to first base. So, I concur that this is something that really ought to be looked into.

The other thing I'd like to just mention is that the budget for the IAEA safeguards is $130 million this year. The Portland, OR, Police Department has a budget of $141 million. One of them deals with the world, and the other one deals with a city—modest-sized city, in a relatively tame state.

Mr. SOKOLSKI. There is one problem, though. When the United States piles on voluntary contributions, it turns out that it becomes the biggest funder of the safeguards budget, even though it's a ridiculously small amount. That has political implications. What you want is for us and others to pay more in some kind of more routinized, country-neutral formula. The problem right now is, they use this U.N. assessment model, and that model has a country like Italy, that has no power reactors online, paying more than South Korea, which has 20 reactors online. That's got to change. I mean, I don't know whether nuclear power, by the way, is going to expand. I mean, they talk about all the reactors they're going to build, they forget about all the reactors they've got to take down and decommission, which is about, I don't know, 300 or 400 machines in the next 30 years, so it's not so easy to see a net increase. It's not a given. But, if there is, you doubly want to pay attention to this point.

Senator LUGAR. Yes, Doctor.

Dr. MCGOLDRICK. Yes, may I just make a comment? I would like to dissent from my colleague's statement urging you to put in the legislation language that the United States does not believe that countries have inalienable rights to any of these technologies. I'm afraid that's very counterproductive. I think it's hamfisted. It's going to produce just the opposite result of what we intend.

When the President announced his policy, in February 2004, he promised fuel assurances to countries that renounced enrichment and reprocessing. John Bolton, at the 2005 NPT PrepCom to the NPT, said, explicitly, that states party to the treaty don't have rights to these technologies. Well, this produced a very sharp reaction, very negative reaction among states. And I, frankly, think that we need to have a more sophisticated and more deft approach. We need to offer these as incentives to urge countries to forgo enrichment and reprocessing, but not to go out and challenge their rights to have it, because this is a visceral reaction that we get, and we're not going to get support for this.

Mr. SOKOLSKI. By the way, I would agree, don't tell them what their rights are. But I think it's untenable for the United States to be insisting that countries clearly have the right. If you could at least make our policy neutral on this question, to say at least we don't believe Iran has a right to enrich, I think you get it about right. Where we're headed is saying that, "Well, we won't say that you don't have a right; in fact, we're going to say you do, and we're going to let you get access to fuel while you continue to insist that, at any given time, you can start making fuel yourself." That's not a—really where you want the bank to be working its magic. So, if you can just at least get the U.S. Government to not have the same official position as the Government of Iran, I'll settle for that. And the Hyde language, that you've already approved, would do that.

Senator LUGAR. Well, thank you very much, gentlemen. I return to the chairman.

Senator CASEY. I know we have to wrap up, and I want to thank Senator Lugar for allowing the witnesses to engage each other, which doesn't happen enough, often, at these hearings, and I appreciate his willingness to allow you to mix it up a little bit.

I know we have to wrap up, and I'll just ask one final question for each of you, and you can be very brief, if you can. You can amplify your answer in the record.

But I guess I'd ask you a two-part question. No. 1—we'll start with the bad news and then move to good news—the bad news is: What's your worst fear, in terms of our present situation, with regard to all of the limitations and the inability of the IAEA to do what it must do because of those limitations, whatever they are—budgetary, personnel, infrastructure, equipment, go down the list—but what's your worst fear, based upon that reality and the reality of the interests of Iran and others? And, second, on a more positive note, what are the two or three specific things that this Government should be doing, in addition, of course, to the legislation we've been here to discuss—what are the two or three steps that this Government should take to forestall or to mitigate or deal with that nightmare that you would outline? If you could do that rather quickly. And I think we'll start with Dr. McGoldrick, in reverse order of the introduction of the witnesses.

Dr. MCGOLDRICK. I'd—thank you—my worst fear. Your question relates to—specifically to the IAEA?

Senator CASEY. Well, I think it really relates to—in light of these limitations and problems that the IAEA is dealing with, and we're talking about today, what's your worst fear, based upon that—that in addition to what we've talked about with regard to Iran?

Dr. MCGOLDRICK. Well, I think—I guess my worst fear is that, while the IAEA may find—or declare a state in violation of its safeguards agreement, my worst fear is that the international community—and specifically the U.N. Security Council—will not have the political will to take appropriate action to deal with that problem.

Senator CASEY. And what steps would you take to deal with that fear?

Dr. MCGOLDRICK. Well, that's a difficult challenge. One has to work very closely with countries such as China and Russia, in particular, to impress upon them the importance of preventing the spread of nuclear weapons and to try to convince them to take appropriate actions, when necessary, when a country is in—obviously in violation of its safeguards agreement. That, and I would also go back to the issue of financing. I would hope that the international community would find a way to provide the agency with the resources—and the financial and technical—that it needs to do its job.

Senator CASEY. Dr. Scheinman.

Dr. SCHEINMAN. Well, I thought that was a pretty good comment by Fred, with respect to a worst fear. I would take one step back, to say that one of the problems I see in the agency today is gridlock on the board of governors. All you need to do is look at what happened with this Special Committee on Safeguards; it came to naught, had 18 proposals before it, and couldn't get any agreement, because political issues are intervening, preventing anybody from being able to reach consensus. Iran played its cards very well, mobilized support among members of the board. The United States pressed very hard to say, "What this is really all about is Iran," which probably was not the best tactic to take, even if true. And if we have continued gridlock on the board, we're going to have ourselves problems in getting anything done. They are the governing body, and they both direct and encourage and enforce the Secretariat to take actions in particular directions. Therefore, I would encourage the United States to shift its diplomacy, in terms of dealing with some of these issues and try to build consensus, build linkages with other countries—China and Russia, certainly—but also to get at some of the nonaligned countries. There's a powerful force there, being led largely by South Africa, that really intends to hold our feet to the fire, and we ought to find ways and means to be able to address legitimate concerns and, at the same time, promote our national interest.

Senator CASEY. Thank you, Doctor.

Mr. Sokolski.

Mr. SOKOLSKI. All of what's been said, I would agree with. I would add, perhaps, one other thing that is a worry and that is that the agency is increasingly running the risk of not doing its mission at all, which is material accountancy. And what it's going to, perhaps, become is a kind of glorified Keystone Cop operation

that you call in when you have a problem and you want to buy time by having them inspect the daylights out of something and not come to a conclusion. You don't want that. That's where it's headed.

I think part of the reason why is the funding, but the other is this false consciousness, that if we look at something, we're safeguarding it; when their own definitions make very clear, that's not enough to meet the criteria.

The other fear I have is the one that's just been raised. If you don't arrange a number of country-neutral rules for proceeding against noncompliant and violating parties, to say nothing of withdrawing parties, you run the risk of them enforcing nothing.

In the report, there are a number of very specific proposals on what you can do without the U.N. Security Council and the IAEA consensus. You should perhaps review those and see whether any are to your liking, because the committee actually can act on them.

In addition to the fee idea—and I would start with a voluntary thing, because that's harmless—and making a distinction between safeguarding and monitoring, three specific ideas:

First, money needs to go to what they call "near real-time surveillance capabilities." There is a way to actually know whether the cameras and monitors are on. It costs money. It's more than their budget can bear, but it's not heroic. You might, the next time you visit—I'll give you the names of who to talk to—take a brief on it.

Second, here's something I would do, for sure, and the United States can do this by itself. We need to reassess all of the technical premises behind what it takes to make a bomb, how long it takes to convert different materials into bomb fuel, and how frequently you would have to inspect to detect a diversion before it was completed. The premises that the IAEA has on each one of those fronts are woefully out of date, and that's detailed in the report.

Last, but not least—and I like this one the best—if you're really in doubt about what to do as a Senator about a problem, sometimes it pays—and I'm—I guess I'm being a little sarcastic here, but I can't resist—to enforce the laws you already passed. It's not done all the time, but it surprises and astonishes people when you do it, and it really keeps them off-guard. There is a title V—I recommend it—of the Nuclear Nonproliferation Act, that was passed in 1978. And what it does is, it asks for reports and efforts to identify nonnuclear, nonfossil-fuel energy sources that could help developing countries. To my knowledge, no President, Democrat or Republican, has ever enforced this law or obeyed what was dictated as something they had to follow. It would be tremendous fun to just ask where the report is, after 30 years. And, by the way, it's supposed to annual. And there are recommendations in that title of other things that should be done. I would actually start there.

Senator CASEY. Thank you very much.

Senator Lugar.

Well, with that, we want to thank each of our witnesses for your testimony today, and I want to thank Senator Lugar for his work on this issue, and, in particular, a meeting we had a couple of months ago, when he was reviewing a lot of these issues with me. And I'm grateful for his continued dedication to this issue.

And there are no further proceedings, and, for that reason, this meeting is adjourned.

[Whereupon, at 11:47 a.m., the hearing was adjourned.]

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

PREPARED STATEMENT OF SENATOR JOSEPH R. BIDEN, JR., U.S. SENATOR FROM DELAWARE

Today our committee is holding a hearing on a subject of vital importance for U.S. national security and for peace and stability around the world: How can the world enjoy the benefits of civilian nuclear energy without increasing the risk that more countries will acquire nuclear weapons?

In his time President Kennedy worried that by the mid-1970s the United States might face a world in which 15 or 20 countries possessed nuclear weapons. By that standard, the nuclear nonproliferation regime has been remarkably successful. A central part of that success has been the system of safeguards on civilian nuclear technology overseen by the International Atomic Energy Agency (IAEA). The purpose of safeguards is to ensure that countries are fulfilling the pledges they have made to forgo nuclear weapons, even if they are making use of civilian nuclear technology. A well-functioning IAEA safeguards system is essential to nonproliferation.

But the IAEA and its safeguards system are facing intense challenges. The world rightly keeps asking more of the IAEA safeguards system, but the IAEA is not getting the funds it needs to meet those demands. Many countries are looking to nuclear power as a response to climate change and energy insecurity, but the IAEA struggles to find and retain enough qualified nuclear inspectors to keep up even with today's demands.

Even if the IAEA safeguards system can overcome these challenges, it may not be able to cope with a wide diffusion of the technology to enrich uranium or to reprocess spent fuel to extract plutonium. These technologies are used to create the fuel for civilian nuclear power, but they also can be used to create weapons-usable material. Producing material suitable for nuclear weapons is the most difficult hurdle for countries in acquiring nuclear weapons, so the spread of enrichment and reprocessing technology beyond the small number of countries already possessing it poses serious risks for U.S. national security.

To address these risks while meeting a growing demand for nuclear fuel, several nuclear fuel supplier states, including the United States, along with the IAEA and nongovernmental groups such as the Nuclear Threat Initiative, have proposed some type of guaranteed access to nuclear fuel for states that play by the rules and are looking to make peaceful use of nuclear power. With confidence in such fuel supply assurances, it is hoped, countries could forgo the costly and risky pursuit of enrichment and reprocessing technology.

I want to thank Senator Casey for agreeing to chair today's hearing in my absence; he could not have chosen a topic more important to the long-term national security of the United States. The committee is fortunate today to hear from well-qualified witnesses, including our colleague Senator Bayh of Indiana. Senator Bayh and the ranking member of our committee, Senator Lugar, are the coauthors of S. 1138, the Nuclear Safeguards and Supply Act. On June 27, our committee unanimously ordered that bill to be reported to the full Senate. The Lugar/Bayh bill addresses the same challenges the committee is meeting on today, and is an important contribution to congressional consideration of these important questions. I hope today's hearing will contribute to perfecting that bill and to gaining the full Senate's support for it.

I look forward to the insights and recommendations from all our witnesses on how the IAEA safeguards system can meet the challenges it already faces and how it might accommodate an expansion of nuclear power without increasing the chances that more states will acquire nuclear weapons.

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