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NUCLEAR POWER

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

TO

RECEIVE TESTIMONY REGARDING THE ROLE OF NUCLEAR POWER IN NATIONAL ENERGY POLICY

JULY 13, 2004

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NUCLEAR POWER

TUESDAY, JULY 13, 2004

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 10:05 a.m. in room SD–366, Dirksen Senate Office Building, Hon. Pete V. Domenici, chairman, presiding.

OPENING STATEMENT OF PETE V. DOMENICI, U.S. SENATOR FROM NEW MEXICO

The CHAIRMAN. This hearing of the Energy and Natural Resources Committee on the role of nuclear power in our national energy policy is now in session. The purpose of the hearing is to evaluate the progress of various nuclear energy programs at the Department of Energy, to better understand the administration's commitment to nuclear energy. Today I want to discuss all of the Department's nuclear energy programs in the context of what I hope is an integrated administration strategy for a renaissance of nuclear energy.

With Friday's court decision on Yucca Mountain, the Department's preliminary views on that decision will be of great interest to the committee. Currently 103 nuclear power plants are operating in the United States. These reactors provide 20 percent of the electric power needed for our Nation, thereby injecting important diversity into our energy supplies. Nuclear plants provide the Nation's lowest cost electricity other than hydropower, emit no atmospheric pollutants, excel at providing steady baseload power essential for anchoring grid stability, have demonstrated outstanding reliability, and have a superb safety record.

However, the last completed nuclear plant in the United States was ordered in 1973. Combinations of issues, including high upfront capital costs back in those years, unproven regulatory framework for new plants, progress on spent fuel management, and a deregulated and highly competitive electric market, all have contributed to perceived financial risks that to date have precluded new orders.

In contrast, nuclear plants with characteristics well advanced over any in the United States are operating today in Japan, are being built around the world. Four of these plants are under construction in Japan, two in Taiwan, two in Korea, one in Romania, and one in Finland.

In 1997 I said we needed a renaissance of nuclear power in America and today we are on the verge of it, except we do not know

what the circuit court opinion does to that. More voices have joined us in calling for expansion of nuclear energy. Alan Greenspan has testified on the importance of new nuclear plants, and just recently I was presented with a preeminent international spokesman for environmental causes, Gene Lovelock, stated: "We have no time to experiment with visionary energy sources. Civilization is in imminent danger and has to use nuclear power, the one safe, available energy resource, now or suffer the pain to be inflicted on our outraged planet." He is a very out-front environmentalist who has made this statement. "Opposition to nuclear energy," he said, "is based on irrational fear fed by Hollywood-style fiction and green lobbyists and the media. These fears are unjustified and nuclear energy has proved to be the safest of all nuclear powers," he concluded in his statement. That is Gene Lovelock.

I was enthusiastic earlier this year when I learned that three consortia had submitted proposals to begin the process to build the first new power plants in our country in a very long time. This opens the door for a new plan of construction that is critical for our country. It is a process that we will all watch with strong interest.

This has been a roller-coaster year for Yucca Mountain program. The proposal of OMB to move the nuclear wastes off budget, while a good goal, is not well thought out. As noble as this goal was, their execution was lacking. In a year of belt-tightening, they have almost forced Congress to fund the project at a lower than necessary level.

As one possibility, I propose to make up the funding shortfall with a one-time transition cost increase on nuclear utilities. Of course, the whole program is now assessing last Friday's court decision about the 10,000-year radiation standard for the repository. I will continue to work with others—the Department, the administration, and industry—to solve these challenges.

Testifying today, Senators, is Deputy Secretary of Energy Kyle McSlarrow. Kyle, we always appreciate your views and you will testify shortly.

Senator Bingaman.

STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM NEW MEXICO

Senator BINGAMAN. Thank you very much for having the hearing, Mr. Chairman. Obviously it is very timely. The future of nuclear power in this country is a very important issue and one that I know has been a major focus of your efforts in particular. I have certainly tried to be supportive as well, as most members of this committee have.

I do think the two key issues that obviously I would be anxious to learn more about today relate to Yucca Mountain. One, as you referred to it, is the administration's request to take Yucca Mountain project funding off budget and the almost inevitable reduction in funding for Yucca Mountain that seems to be resulting from that.

Second, this decision last Friday by the court of appeals to vacate the EPA and the NRC rules that use the 10,000-year period, vacate them as being inconsistent with congressional intent that they follow the recommendations of the National Academy of Sciences. Ob-

viously, the National Academy determined that the peak risk was considerably farther out in geologic time and that 10,000 years was not appropriate. I would be anxious to find out what course the administration sees to keep the Yucca Mountain project on track and to move ahead with it in light of all these developments.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Bingaman. I also want to acknowledge the authenticity of your statement, that you have been very helpful. You have also been very helpful in terms of your insight in terms of how we get things done. That is really the issue. We all can keep talking about how good it is, but if we cannot get things done it is like whistling in the dark.

I did not say in my statement, but I think I ought to and then yield to Larry, I think everybody knows that the Environmental Protection Agency and the Department of Energy was finding it difficult to model 10,000 years out in the future. That is almost as far out in the future as civilization in terms of its existence. There may have been a few little villages that sprung up 12 and 13,000 years ago, but essentially there was nothing in the world 10,000 years ago that had to do with mankind.

Yet this report says that the National Academy of Science, which they were supposed to look to, has found that the highest peak of radiation is 300,000 years from now, the implication being if you want to use existing standards and existing statutes your new model is going to have to be 300,000 years.

We can call any scientists or engineers in the world and all of them, nobody will tell you that you can do that. It is impossible. So we have to set out trying to see where we are going.

Let me acknowledge Senator Craig's enthusiastic support, not only for nuclear, but his genuine help in trying to get things done. Thank you, Senator.

STATEMENT OF HON. LARRY E. CRAIG, U.S. SENATOR FROM IDAHO

Senator CRAIG. Thank you very much, Mr. Chairman, and let me thank you for the continued leadership you have demonstrated on the issue of nuclear energy and a path forward for it.

I guess my reaction is, whoever said it would be easy? What we are trying to do here is break out of a mind set that this country has been locked into for 2 decades. The good news is that those who helped establish the mind set are now beginning to see the error of their ways as it relates to abundant clean sources of energy that this country so desperately needs if it wants to retain its position as a world economic leader, and those 103 reactors that are now relicensed and functioning are setting tremendous records as it relates to productivity at low costs, and that is fundamentally important. And by the way, we dare not fail to say they are producing extremely clean sources of energy.

The only problem, and we do face the problem, is that those reactors function substantially based on a path forward as it relates to the management of waste, and that is what we have got to be about.

What we have also got to be about and what I want to recognize Kyle McSlarrow for this morning is the kind of leadership that he

and the Secretary have demonstrated in looking out into the future, along with Bill Magwood and others who are here this morning, to see where we can get and where we must get as it relates to Gen IV and new reactors and new reactor designs. While the court decision of last Friday is going to cause us to be focused for a moment, I hope it is not but a moment, and I hope that you and I and the other Senator from New Mexico, Senator Bingaman, can show the kind of leadership with the Senate and the Congress to recognize that, while the EPA and others looking at the 300,000 years did not think they could get there and it was not necessary to get there and 10,000 years was more realistic, but if you carry it a step further it was also that the peak dosage was 300,000 years and you ought to really look out a million years.

There are many of us who would like to think we are visionary as it relates to the shaping of public policy. But the best of our scientists and the best of the engineers the world over are not there, cannot get there, and will not get there. And maybe we have to rethink our policy a little bit, that we were designing a policy in an era of nuclear schizophrenia and that is changing today and there is a much more realistic attitude growing across America.

That attitude is already in France and in Europe, where they were facing energy crises long before our abundance denied us and now we face crisis.

So I hope we can get there. I think we can get there and we should get there. While we are getting there, I think it is important that we look at the 20 percent nuclear base we currently have, wishing it were 30 or 40 as it relates to clean energy, and that we have a plan to do so, certainly in working with the Department and with our national laboratory in Idaho to develop a premier nuclear laboratory and the kind of new design and development that we hope can get there.

My questions this morning are going to be directed at that and the future, not a bump in the road that I would hope and that I would wish that the Congress would view the circuit court decision, will change the language so the judges can look at it a bit differently. They too I think need to be realistic, and certainly our country is headed in that direction.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator.

Mr. Secretary, before you testify, I just want to put on the record: Senator Craig said that all of the nuclear reactors have been relicensed. But that is not so. I did not want to stop him.

Senator CRAIG. No, not all 103, that is correct.

The CHAIRMAN. In fact I was going to ask you, how many? Twenty or thirty or something like that out of the 103 operating?

Mr. MCSLARROW. Twenty-six to date, although we do expect that all of them ultimately will be relicensed.

The CHAIRMAN. Thank you.

Please proceed.

STATEMENT OF KYLE E. McSLARROW, DEPUTY SECRETARY, DEPARTMENT OF ENERGY

Mr. MCSLARROW. Thank you, Mr. Chairman. Mr. Chairman, first, obviously I will summarize this testimony and submit it for the record.

I would like to thank you and Senator Craig and Senator Bingaman for your leadership. You have been working on these issues a long time, as you noted, often during a period when some analysts were predicting the end of nuclear energy in the United States. It is important to recall that during the last decade things looked very bleak for nuclear power in the United States. The door seemed to close on the future of nuclear power early in the decade as the Shoreham nuclear power plant on Long Island was finally closed in 1992. That event showed that even a completed plant in which $5.5 billion had been invested, which had been licensed to operate by the NRC, which had a virtual twin that had been operating in Connecticut for 2 decades, even this plant could fail to reach commercial operation.

The following year saw the termination of nearly all of the Department of Energy's nuclear energy research and development activities. The bottom came in fiscal year 1998. In that year the Department's civilian nuclear energy research funding fell to zero. At the time I am sure that many saw this as an embarrassing collapse in what had once been a world-leading research program. But many members of this committee and you, Mr. Chairman, have provided support to get us back on our feet again.

At the same time, during that decade what might not have been obvious was many positive trends. The industry was making tremendous progress in operating U.S. nuclear power plants more efficiently. After trailing behind nuclear programs in other countries, U.S. operators responded vigorously to the challenge of deregulation with better management and a new focus on the efficient and reliable operation of U.S. plants.

The key event in the revival came when the President unveiled the National Energy Policy, in which we issued a clear policy statement of encouraging the expansion of nuclear power. With the recommendations of the NEP guiding our program and policy decisions, we were able to focus the Department's nuclear energy program and enhance its core mission of nuclear energy research.

I would like to briefly summarize these programs. First, we believe that state-of-the-art nuclear power plants developed by U.S. and overseas suppliers can and should play an important role in meeting U.S. energy requirements in the next decade. Under the auspices of the Nuclear Power 2010 program, we are working with industry to pave the way for an order to be placed for a new U.S. nuclear power plant in the next few years.

We have seen important successes in this program already, with three U.S. utilities partnering with the Department to test the Nuclear Regulatory Commission's early site permitting process.

Last November, the Department challenged the utility industry to organize itself to evolve from the study and evaluate stage to consider specific projects that could result in the construction of new nuclear power plants. We asked those utilities to form teams that could create solid plans to demonstrate the major components

of the NRC's licensing regime that remains untested, the one-step licensing process, which is formally known as the combined construction-operating license process. We have received three proposals from industry thus far.

I should note, Mr. Chairman, that I realize we are going to get into Yucca Mountain today. Our view is that continued progress toward establishing a high-level waste repository at the Yucca Mountain site is absolutely essential. We are still on track toward submitting a license application in December and opening a repository and beginning waste acceptance in 2010, and it is extremely important to put in place a long-term funding solution if 2010 is to be a reality. We look forward to working with you and the other members on this.

Mr. Chairman, we also have to plan for the longer term, as Senator Craig pointed out. We have two complementary programs designed to achieve this. First is the Advanced Fuel Cycle Initiative, which is designed to develop a better, more efficient, and more proliferation-resistant nuclear fuel cycle that can support an expanding role for nuclear power in the United States.

The second technology program is Generation IV. Technology needs to provide a nuclear plant of the future that is a superior business choice, essentially to natural gas or other options in direct head-on competition, with the kinds of attributes that I just described as part of the AFCI program. That is exactly the thinking that led to the formation of the Generation IV International Forum, or GIF. That forum is looking at six technology concepts. We have selected one of those concepts that I know we will be discussing, the NGNP, which will be able to make both electricity and hydrogen at very high levels of efficiency.

The Department of Energy is obviously well equipped to pursue this kind of research, development, and demonstration of complex and advanced systems. Most of the labs have excellent capabilities and expertise in various aspects of nuclear technology. We have established a program management structure that brings all of that talent together in an integrated fashion. In managing the Generation IV, AFCI, and nuclear-hydrogen activities, we have developed an integrated structure that designates key laboratory personnel at different labs as national technical directors. Obviously, the Idaho National Laboratory is intended to play a central role.

I know we are going to discuss the RFP's here in a moment, so I will not go into detail right now. But the basic thrust is, as Secretary Abraham has said, to establish a command center of a revived nuclear technology, education, and research enterprise in this country.

Mr. Chairman, we are at a critical moment in deciding our energy future. As Secretary Abraham and you have said, we need to get our energy house in order. We believe that task requires a strong contribution by nuclear energy well into this century. Ensuring this occurs is a formidable challenge, but we need to start now.

The past 3 years has seen a dramatic change in terms of actions taken, increased industry interest, and a broader recognition of the benefits of nuclear energy. We look forward to working with you and this committee in resolving those challenges and meeting these goals.

Thank you, Mr. Chairman.

[The prepared statement of Mr. McSlarrow follows:]

PREPARED STATEMENT OF KYLE E. MCSLARROW, DEPUTY SECRETARY, DEPARTMENT OF ENERGY

Good morning, Mr. Chairman and members of the Committee. It is a pleasure to be here today to discuss the progress we are making toward restoring nuclear power as a vibrant and realistic option to meet this Nation's future energy needs. Building on industry's success with the efficient and safe operation of current nuclear power plants, the Bush Administration is looking to both pave the way for deployment of new plants in the next few years and point the way toward a new generation of nuclear energy for the future.

First, Mr. Chairman, I would like to thank you for this Committee's leadership. Even before President Bush took office in 2001, you, Senator Craig, Senator Bingaman and others were working on the issues facing nuclear energy in this country—often during a period when some analysts were predicting the end of nuclear energy in the United States. This committee's efforts provided a solid programmatic and policy foundation that has made the progress we are seeing today possible. While, as we all know, there is still much to be done, I believe that it is important to recognize the success that we have seen in the nuclear field over the last few years.

It is important to recall that during the last decade, things looked very bleak for nuclear power in the United States. The door seemed to close on the future of nuclear power early in the decade as the Shoreham nuclear power plant on Long Island, New York was finally closed in February 1992 after a long, contentious fight. That event showed that even a completed plant in which $5.5 billion had been invested, which had been licensed to operate by the Nuclear Regulatory Commission, which had a virtual twin that had been operating in Connecticut for two decades—even this plant could fail to reach commercial operation.

The closure of Shoreham seemed to herald a stream of bad news for nuclear power. The following year saw the termination of nearly all the Department of Energy's nuclear energy research and development activities. Work on programs such as the Integral Fast Reactor, the Gas-Turbine Modular Helium Reactor, and the SP-100 space reactor were all brought to a rapid end. The number of students taking up nuclear engineering in the United States was in free-fall—dropping from about 1,500 before Shoreham to less than a third that level by 1997.

Deregulation of the electric utility industry and the advent of the competitive electricity market led many analysts—and more than a few members of Congress—to predict that nuclear power plants would become "stranded costs" that would force their owners to close them prematurely and replace them with smaller plants fueled by demonstrably cheap and apparently infinite supplies of natural gas.

The Yucca Mountain project was stuck in neutral. While taking in hundreds of millions of dollars of ratepayer money each year, the program, delayed by litigation and funding shortfalls, was making little progress towards its goal of accepting commercial and defense high-level nuclear waste by 2010.

In this environment, the nadir came in fiscal year 1998. In that year, the Department's civilian nuclear energy research funding fell to zero.

At the time, I'm sure that many saw this as an embarrassing and harmful collapse in what had once been a world-leading research program. But many of the members of this Committee provided support and encouragement that made it possible to begin the long process of rebuilding the Federal nuclear energy program.

At the same time, industry made tremendous progress in operating U.S. nuclear power plants more efficiently. After trailing behind nuclear programs in other countries for many years in terms of efficient operation, U.S. operators responded vigorously to the challenge of deregulation with better management and a new focus on the efficient and reliable operation of U.S. plants. U.S. capacity factors were less than 70% when the 1990s began and topped 90% only ten years later, leading the world in the safe and efficient operation of nuclear power plants. Moreover, the Nuclear Regulatory Commission has acted quickly and effectively to enable utilities to "uprate" their plants and extend operating licenses for an additional 20 years. One result—which is very different from the picture that some analysts painted only a few years ago—is that essentially all nuclear power plants in the country are expected to apply for license renewals.

The key event in the revival came when the President unveiled the *National Energy Policy* (NEP). For the first time since the Department of Energy was formed in 1977, the Government issued a clear policy statement encouraging the expansion of nuclear power to meet our future energy needs. With the recommendations of the NEP guiding our program and policy decisions, we were able to focus the Depart-

ment's nuclear energy program and enhance its core mission of nuclear energy research. We started important new initiatives and Secretary Abraham authorized the formal creation of the Generation IV International Forum, the model for many of the international efforts the Department is pursuing today. Most recently, we set off to establish a premier laboratory for nuclear energy research and development, the Idaho National Laboratory.

In parallel with this progress, Secretary Abraham, citing the sound scientific work conducted by the program since its inception, recommended and the President accepted the Yucca Mountain site as the best place to build the Nation's high-level waste repository. This step cleared a major roadblock in enabling a vibrant U.S. nuclear power program to move forward. With Congress's strong votes in support of the site selection; and the Department's demonstrated progress toward meeting our goal to establish a geologic repository by 2010, industry saw clearly that the nuclear power option was truly back on the table.

This brings us to today. We have much work ahead of us and I would like to discuss with you today the programs, strategies, and policies that are advancing our goal to assure a strong, long-term role for nuclear energy in helping this country to meet its energy and environmental goals.

ENCOURAGING GENERATION III+

We believe that state-of-the art nuclear power plants developed by U.S. and overseas suppliers can and should play an important role in meeting U.S. energy requirements in the next decade. It is clear that U.S. demand for electricity will continue to increase. Despite the fact that the U.S. economy has become increasingly efficient in its use of energy, growth in energy use and growth in economic activity remain linked. The Energy Information Administration projects that assuming modest economic growth of three percent annually through 2025, U.S. energy use will grow by about 1.5 percent each year. While this does not sound like a big number, this means the U.S. will need to build over 335,000 megawatts of new capacity during that period to meet the demand and this does not include the plants we will need to build to replace older, retiring plants.

Industry has generally anticipated that most of these new plants would be efficient gas-fired units similar to those that comprise the vast majority of the power plants built over the last decade. Use of natural gas for electric power generation increased by 85% from 1990 to 2002. It is projected to nearly double by 2025—from 685 BkWh today to 1,300 BkWh. This dependency on a single fuel type for new generation represents a potential vulnerability in our energy security.

Nuclear power should be a key part of the U.S. electric generating portfolio. Advanced, Generation III+ light water reactor-based plants are on the market today and more will be available from U.S. and foreign suppliers in the coming years. Advanced Boiling Water Reactors (ABWRs) based on U.S. technology are being built and operated today in Japan and other countries with impressive results. Finland will build a large French-supplied European Pressurized Reactor (EPR) plant to meet the needs of its growing industries. China is planning to build 30 new plants by 2020 to meet its rapidly growing energy requirements.

Under the auspices of the Department's Nuclear Power 2010 program, we are working with industry to pave the way for an order to be placed for a new U.S. nuclear power plant in the next few years. The Nuclear Power 2010 program is designed to work with industry to identify sites for new nuclear power plants, develop and bring to market advanced nuclear plant technologies, evaluate the business case for building new nuclear power plants, and demonstrate untested regulatory processes.

We have seen important success in this program already, with three U.S. utilities partnering with the Department to test the Nuclear Regulatory Commission's Early Site Permit process. Under this process, utilities can work with the NRC to evaluate potential sites for new plants and, if the sites pass regulatory scrutiny, the utilities can obtain permits from the Commission that would ease the licensing of a plant at an approved site in the future.

Clearly, there is great value to such a process. However, like many of the advanced NRC licensing activities that came into force after the Energy Policy Act of 1992, this procedure has never been tested. Under our Nuclear Power 2010, the Department is working with three of the Nation's major utilities—Dominion Resources, Entergy, and Exelon—to evaluate sites in Virginia, Mississippi, and Illinois. This effort has already resulted in applications by these utilities to the Nuclear Regulatory Commission. We anticipate that the first Early Site Permits ever issued will emerge from this work in 2006.

The Department has also funded several important studies under the Nuclear Power 2010 program. For example, we have launched a cost-shared study with the petrochemical industry to explore the benefits to industrial users of natural gas of building a new nuclear power plant in the Southwest. Most important, in 2002 we completed an independent business case analysis that was based on comprehensive interviews and workshops with industry leaders and Wall Street experts. The resulting report, *Business Case for New Nuclear Power Plants in the United States*, provided an authoritative account of the business and financial issues facing utilities that are considering the construction of new plants.

The *Business Case* study found that there are two primary obstacles to building new plants in the United States:

1. The difficulty in obtaining up-front financing for a large project that requires five or more years to complete; and
2. The uncertainty in the untested licensing process.

The first issue reflects the changes in the market since the last plants were built. In the 1970s, a utility deciding to build a nuclear plant simply placed the order and paid for all the necessary design and engineering work required for the project. Costs were generally passed on to ratepayers as part of the cost needed to assure a long-term electricity supply. Today, the situation is very different. Because utilities are unable simply to pass costs to ratepayers in the competitive markets in which many now operate, they are unwilling to absorb the very expensive up-front design and engineering work required for new plant technologies to be brought to market. Further, because of the scrutiny utilities face from investors and credit rating organizations, they are very reluctant to make large capital investments of any kind—especially if these investments have a multi-year long impact on earnings.

The second issue reflects the negative experiences utilities had in the late 1970s and early 1980s. Few utilities are interested in making investments in billions of dollars in a new power plant if they can't be certain that they can operate the plant on a predictable schedule—or, in a worst case, if there is a prospect that they won't be able to operate at all. The legacy of Shoreham looms large in this thinking.

It is in this context that we designed the next step in the Nuclear Power 2010 program. On November 20, 2003, the Department challenged the utility industry to organize itself to evolve from the "study and evaluate" stage to consider specific projects that could result in the construction of new nuclear power plants. We asked the electric utilities to form teams that could create solid plans to demonstrate the major component of NRC's licensing regime that remains untested: the "one-step" licensing process, which is formally known as the combined construction/operating license (COL) process.

By receiving the authorization to construct and the authorization to operate at essentially the same time, a utility could build a new plant with a very high degree of confidence that a well-executed project will allow a new plant to go on-line on schedule.

We have received three proposals from industry thus far. We have awarded costshared funding to one consortium led by the Tennessee Valley Authority to verify vendors' cost and schedule estimates to build an ABWR at the utility's Bellefonte site near Hollywood, Alabama. The results of this work will be available in April 2005 and will be used to allow the TVA Board to make an informed decision about the future of this concept.

Two other consortia have also made proposals. One, led by Dominion Resources, would demonstrate the COL process using technology from Atomic Energy of Canada, Limited (AECL); the other is led by a large consortium of 9 utilities that plans to consider two technologies—the Westinghouse AP-1000 and the General Electric Enhanced Simplified Boiling Water Reactor (ESBWR). Since this procurement action is still open, I am not at liberty to discuss the details of the industry proposals.

YUCCA MOUNTAIN: CONTINUING THE PROGRESS

If we are to see our Nuclear Power 2010 efforts develop into actual nuclear power plant projects, continued progress toward establishing the Nation's high-level waste repository at the Yucca Mountain, Nevada site is absolutely essential.

This Administration has made a strong commitment to resolving the nuclear waste challenge and making the construction of a repository achievable. We have followed through on that twenty-year commitment with important actions, such as the 2002 recommendation of the Yucca Mountain site and support for the enactment of the Congressional joint resolution that enabled the Department to move toward licensing the repository. This decision allows the Nuclear Regulatory Commission—an independent regulatory body implementing an extensive set of regulations—to

review the science during a rigorous three-to-four-year licensing process, which will involve many other parties and will be open to public scrutiny.

We are moving ahead with developing a high-quality license application for submittal to the Nuclear Regulatory Commission at the end of this year. The application is built on over 20 years of sound science, making Yucca Mountain the most exhaustively studied project of its kind in the world. Since the Nuclear Waste Policy Act of 1982 was enacted, five Presidents have overseen work on a geologic repository for spent nuclear fuel and high-level waste. This Administration's policy has been to complete the science, to fulfill all the technical and institutional requirements laid out in the Nuclear Waste Policy Act, and begin construction if authorized by the NRC.

At the end of June, the Department fulfilled a prerequisite for submittal of the license application, certifying the availability of approximately 1.2 million documents, totaling some 5.6 million pages, submitted by the Department for the Nuclear Regulatory Commission's Licensing Support Network. The Licensing Support Network is an electronic, Internet-based discovery system that will allow the Nuclear Regulatory Commission, the public, and parties to the licensing proceeding electronic access to the results of scientific studies and other information used to develop the license application.

This system is the first of its kind, and its development is providing lessons learned for many of the parties involved. We are working out technical issues and ensuring that we do not disclose individuals' privacy information. It is important to note that the Licensing Support Network is not the License Application—the document collection supports the License Application, which will provide context and present the substantive conclusions drawn from these documents.

We are still on track toward submitting a license application in December of this year, and opening a repository and beginning waste acceptance in 2010. The President's Fiscal Year 2005 budget reflected the funding needed to maintain these long-standing goals, and, in parallel; the Department offered a legislative proposal to resolve a funding problem that has burdened the Program for many years. It is extremely important to put in place a long-term funding solution if 2010 is to be a reality, and we look forward to working with the Congress further to achieve this objective.

TECHNOLOGY OPTIONS FOR THE LONG-TERM FUEL CYCLE

Our Advanced Fuel Cycle Initiative (AFCI) is designed to develop a better, more efficient, and more proliferation-resistant nuclear fuel cycle that could support an expanding role for nuclear power in the United States. AFCI technologies could provide important benefits such as enhancing national security by lowering proliferation risk through the reduction of inventories of commercially-generated plutonium contained in spent fuel. AFCI will also enhance national energy security by recovering the significant energy value contained in spent nuclear fuel—the 44,000 metric tones of spent nuclear fuel currently stored at nuclear power plant sites across the country that contain the energy equivalent of over 6 billion barrels of oil, or about two full years of U.S. oil imports.

One possible key to realizing these benefits is the development of advanced separation technologies. These are technologies that can remove the useful components of spent nuclear fuel from the materials that must be disposed as waste. This is not a new field of study. The United States developed PUREX technology during the Manhattan Project to provide plutonium for use in atomic weapons. PUREX technology is used today in Europe to reprocess spent fuel.

However, while commercial reprocessors have done much to improve existing separation technology, it remains too expensive, generates too much high-level waste, and separates plutonium that presents a long-term proliferation risk. We believe it is the wrong technology for the future and the *National Energy Policy* reflects this. We have, instead, focused on two technologies that show great promise.

Through the AFCI program; our scientists have invented a technology known as Uranium Extraction Plus (UREX+), an advanced aqueous process that can be used to remove the uranium and a combination of plutonium and selected minor actinides from spent nuclear fuel. It is our hope that this technology will prove proliferation-resistant enough to provide the benefits of recycling spent fuel without increasing proliferation risks.

Another technology, pyroprocessing, was investigated during the Integral Fast Reactor program of the 1980s. In its current form, it is proving to be a highly efficient, proliferation-resistant, non-aqueous approach to separate the actinides in spent fuel from fission products. The AFCI pyroprocessing activities support the ultimate reduction of the radiotoxicity of nuclear waste through the transmutation of minor

actinides in future Generation IV fast spectrum reactors or in dedicated transmuter devices. In addition, these activities provide the means for closure of the fuel cycle for Generation IV fast reactors.

The AFCI program is preparing for its next steps—larger-scale demonstration of key technologies and development and testing of advanced transmutation fuels. If successful, this research will reduce the toxicity of nuclear waste to the point that it will decay to the same toxicity as natural uranium ore in less than 1,000 years—instead of the 300,000 years required without AFCI technology.

MOVING FORWARD WITH GENERATION IV: NGNP

Current, state-of-the-art Generation III+ technologies such as AECL's ACR-700, the Westinghouse AP-1000, and the GE ESBWR could serve the future market for nuclear energy well. Our Nuclear Power 2010 program is designed to help utilities decide among these technologies and to place new plant orders. While utilities are positively engaged in this effort, we cannot ignore the fact that ordering a new nuclear plant remains a tough decision for any utility operating in a competitive market. As we look to the longer-term future, it is clear that nuclear power must find a way to deal with the structural issues that potentially limit its expansion.

Again, we believe advances in technology can provide a path-forward. To allow nuclear to compete more effectively with other energy options, it will be necessary for the utility decision to build a nuclear unit to be a matter of fuel mix rather than an issue of cost and risk. In other words, technology needs to provide a nuclear plant that is a superior business choice to natural gas units or other options in a direct, head-on competition. Such a plant must be capable of coming on-line in a time frame similar to a gas plant, with no more financial risk. Such a plant must be licensed and regulated under a regime that recognizes its safety advantages. Such a plant must be highly flexible and able to serve the needs of the market as they evolve.

This is exactly the thinking that led to the formation of the Generation IV International Forum, or GIF. That group, in coordination with the Nuclear Energy Research Advisory Committee (NERAC), led the evaluation of over 100 different nuclear energy concepts by over 100 expert scientists and engineers from over a dozen countries. After a complex, carefully managed two year process, the GIF concluded that six technology concepts held the most promise for the future and the GIF member countries agreed to establish an international framework to allow all countries to work on the technologies of greatest interest to them in direct partnership with other member countries.

Today, GIF is comprised of ten countries and EURATOM, working together to advance next-generation nuclear energy technologies. Working with brilliant engineers and scientists from all over the world, the GIF has selected six advanced nuclear energy technologies that it will pursue for the future use by nations all over the world. Under U.S. chairmanship, the GIF is at this time completing a multilateral agreement that will allow all GIF nations to share in this important work.

For our part, as we indicated in our report to Congress last year on the U.S. Generation IV program, the Department of Energy has selected one of the six technologies as its lead technology. This technology is now known as the Next Generation Nuclear Plant, or NGNP. The NGNP would be able to make both electricity and hydrogen at very high levels of efficiency; would be deployable in modules that will better fit the highly competitive, deregulated market environment in the United States; and would be extraordinarily safe, proliferation-resistant, and waste-minimizing.

The base concept of the NGNP is that of a very-high temperature gas-cooled reactor system. coupled with an advanced, high-efficiency turbine generator and an even more advanced thermochemical hydrogen production system. We have very high expectations for this technology. As we indicated in our recent request for Expressions of Interest (EOI), we are interested in the eventual deployment of commercial plants that can generate electric power at a cost of less than 1.5 cents/kilowatt hour; produce hydrogen at a cost of less than $1.50/gallon-gasoline equivalent; and cost less than $1,000/kilowatt to construct with a goal of $500/kilowatt.

These characteristics are obviously challenging. But, because of the work we have completed thus far in our work on Generation IV nuclear power systems, we believe these characteristics are achievable. It is very possible that this type of nuclear plant could be brought to market by the 2020s and serve the world's long-term needs for many decades thereafter.

The Department is working with its international partners to define the research and development activities necessary to advance this concept. We have received comments from the U.S. private sector on our NGNP strategy and have also re-

ceived indications from several companies regarding their interest in serving as the Project Integrator. To be successful, such a technology must be flexible, safe, reliable, and consistent with the economic realities of the market.

Our EOI also noted that a management and funding option the Department is considering is to implement a cooperative agreement with a Project Integrator to pursue this technology. This entity would create the mechanisms needed to assure strong private sector and international participation in the project and also assure a solid private sector management approach to the selection of technologies and the construction project. This entity, with its eventual consortium partners, will be able to apply this technology to commercial projects in the U.S. and abroad. We also expect the Project Integrator to build any fuel fabrication or other facilities that will be needed to support commercial use of NGNP technology (though we may, as some potential applicants have already inquired, certain proposals to build such facilities at the Idaho National Laboratory). The Consortium will also be responsible for obtaining an NRC license for the NGNP.

We believe that a strong role for the private sector in this program is essential to its success. Without private sector leadership, the NGNP will lack credibility with industry and it will be very difficult to bring this technology to commercial deployment. We have considerable confidence in the U.S. private sector to assemble the right technologies, the right players, and the right strategy to make NGNP technology a reality.

If we are successful in creating such a technology, we will transform the energy and environment future of the United States. We will not only assure a vibrant, long-term future for nuclear energy that will allow the Nation to benefit from nuclear energy's enviable environmental qualities, but we will expand its advantages from electricity production to fueling the Nation's vast transportation system. In doing so, we will enable the President's vision, as articulated in the National Hydrogen Fuel Initiative, to be realized far earlier than many thought possible.

MANAGING DOE'S NUCLEAR ENERGY AGENDA

The Department of Energy is well-equipped to pursue the research, development and demonstration of complex, advanced systems such as the NGNP because it has access to some of the best scientific and engineering talent in the world—at the DOE laboratories. Because of its roots in the Atomic Energy Commission, most of the Department's labs have excellent capabilities and expertise in various aspects of nuclear technology. The Department has established a program management structure that brings the best technical talent to bear on DOE's nuclear energy R&D programs, no matter where that talent may reside. In managing the Generation IV, AFCI, and Nuclear Hydrogen Initiative activities, for example, DOE has developed an integrated structure that designates key Laboratory personnel as "National Technical Directors" of specific technology areas. These individuals have the responsibility to coordinate work at the national labs with universities, industry, and the international community in areas that they have particular expertise.

We believe that there is a role for many of the labs in advancing our nuclear energy program objectives. I have met personally with the "Seven Lab" group to discuss their ideas on promoting a broad-based nuclear energy research program. And, as I told the senior lab staff at this morning's "Decision-Marker's Forum." We expect to rely on Argonne National Laboratory (with its unique expertise in reactor analysis, reactor safety, physics and computer codes); Oak Ridge National Laboratory (which has great expertise in materials and chemical processes); Pacific Northwest National Laboratory (with its international nuclear safety expertise); Lawrence Livermore National Laboratory (which leads in the consideration of the national security considerations of nuclear technology); Los Alamos National Laboratory (which has some the Department's finest advanced nuclear fuel technology capabilities); and Sandia National Laboratories (which has outstanding energy conversion, systems engineering, and nonproliferation expertise).

Obviously, however, the Idaho National Laboratory will play a central role. As you know, we have issued a request for proposals which will establish a new Management and Operations Contractor at the lab who will have the task of merging the lab operations of Argonne National Laboratory-West and Idaho National Engineering and Environmental Laboratory to create a new, multi-program national laboratory. The new lab will serve as what Secretary Abraham called the "command center" of a revived nuclear technology, education, and research enterprise in this country. We expect that the INL will form close and productive relationships with other national laboratories—particularly those where important, irreplaceable expertise and capabilities exist today.

The development of this new laboratory is a key objective of our Next Generation Nuclear Plant program. It is fair to note that the Department has two coequal purposes in pursuing the NGNP; one is to work with industry to develop and deploy a technology that would help us meet the Nation's long-term energy and environmental goals. The other is to initiate the ten-year effort to build the Idaho National Laboratory into the world's premier nuclear energy research laboratory.

Pursuant to the latter objective, the Department has developed a strategy that assures both a strong management role for the private sector and a major, well-defined role for the INL. In particular, we envision that the INL would have the following key responsibilities in the NGNP project:

- The INL would serve as the Department's lead laboratory and technology agent for the entire project. All of DOE's funding for the considerable research required for the NGNP project will go to the INL. I would expect that INL would coordinate tasks utilizing some of our other outstanding labs which play a significant role in nuclear research and development today.
- DOE's current approach is to maintain the National Hydrogen Fuel Initiative as a distinct program. The INL will conduct the hydrogen technology program and coordinate with the Integrator to eventually marry the NGNP with the hydrogen plant.
- The INL will provide the Integrator and the Consortium with technology support required for the project.
- The Department expects that the INL will also play a major role in the construction of the NGNP; it is our experience that first-of-a-kind components are fabricated at national laboratories.
- The INL will coordinate all educational activities connected with the project, most likely through the proposed Center for Advanced Energy Studies to be collocated with the INL.
- INL will serve as the primary point-of-contact on the relevant Generation IV International Forum "system steering committee" related to NGNP technology and coordinate any international government-to-government research and development work.

Beyond nuclear energy research, we envision the INL continuing to serve as a multi-program laboratory, with a broad and varied portfolio of work. We believe that a diverse scope of work activities would provide a sound intellectual basis for the lab and help attract the wide range of expert researchers and technologists from many disciplines that will be needed to allow us to reach our ambitious nuclear energy goals. In addition to its nuclear energy role, the request for proposals indicates that the new INL M&O contractor will:

- Consolidate at the INL the ability to fabricate, test and assemble plutonium-238 power systems needed for both national security and space exploration;
- Establish a world-class Center for Advanced Energy Studies in Idaho Falls, Idaho, in which the INL, Idaho universities and other regional and national universities cooperate to conduct on-site research, classroom instruction, technical conferences and other events;
- Be a lead science and technology provider in nuclear nonproliferation and counter proliferation activities, and play an increased role in developing science-based, technical solutions for protecting the country's critical infrastructure; and
- Research, develop, demonstrate and deploy technologies that improve the efficiency, cost effectiveness and environmental impacts of systems that generate, transmit, distribute and store electricity and fuels.

For the nuclear energy and other missions, we have asked the Nuclear Energy Research Advisory Committee to evaluate the assets in Idaho and to recommend to us improvements it believes we should make not just in facilities and equipment, but also in less tangible areas, such as personnel development and incentives and laboratory culture. We look forward to receiving their recommendations later this year.

ENHANCING NUCLEAR TECHNOLOGY EDUCATION

Finally, Mr. Chairman, I think it is important that I highlight the progress we have made in reversing the decline in nuclear engineering in the United States. With significant support and encouragement from this body and your colleagues in the House of Representatives, we are now reversing the decline in undergraduate enrollments in this area of study that began in 1993 and continued through 1998. In 1998, the U.S. saw only around 500 students enrolled as nuclear engineers—down from almost 1,500 in 1992. After several years of focused effort, the United States now has over 1,300 students studying nuclear engineering. That number is

set to increase further, as strong programs—such as at Purdue and Texas A&M, not to mention Idaho State University and the University of New Mexico—continue to grow and we see new programs start at schools such as South Carolina State University, the University of South Carolina, and the University of Nevada-Las Vegas.

The growth of nuclear energy in the United States is dependent on the preservation of the education and training infrastructure at universities. The research conducted using these reactors is critical to many national priorities. Currently, there are 27 operating university research reactors at 26 campuses in 20 states. These reactors are providing support for research in such diverse areas as medical isotopes, human health, life sciences, environmental protection, advanced materials, lasers, energy conversion and food irradiation.

The most exciting development in University Reactor Infrastructure and Education Assistance is the Innovations in Nuclear Infrastructure and Education (INIE) Program established in FY 2002. In FY 2003, two additional university consortia were awarded, bringing the total to six INIE grants, providing support to 24 universities in 19 states across the Nation. These consortia have demonstrated remarkable collaborative efforts and strong formation of strategic partnerships between universities, national laboratories, and industry. These partnerships have resulted in increased use of the university nuclear reactor research and training facilities, upgrading of facilities, increased support for students, and additional research opportunities for students, faculty and other interested researchers.

We plan to do even more to support nuclear technology education in the future. With the advent of the Idaho National Laboratory's proposed Center for Advanced Energy Studies, we expect that the lab will become a center point for strengthening nuclear education nationwide. We look forward to the opportunities this new Center will create for our efforts to maintain and enhance the Nation's nuclear education infrastructure.

CONCLUSION

Mr. Chairman, we are at a critical moment in deciding our energy future. As Secretary Abraham and you have said, "we need to get our energy house in order." We believe that task requires a strong contribution by nuclear energy well into this century. Ensuring this occurs is a formidable challenge. But we need to start now; the past three years has seen a dramatic change in terms of actions taken, increased industry interest, and a broader recognition of the benefits of nuclear energy. We look forward to working with you and this committee in resolving outstanding challenges and meeting these goals.

The CHAIRMAN. Thank you very much, Mr. Secretary.

I want to ask Senators that came late if they would like to make a brief opening remark. Senator Alexander and Senator Bayh, and then we will ask Senator Bunning. Would you like to make a remark?

STATEMENT OF HON. LAMAR ALEXANDER, U.S. SENATOR FROM TENNESSEE

Senator ALEXANDER. Yes, Mr. Chairman, and I will make it brief. Thank you. Thank you, Mr. Secretary, for——

The CHAIRMAN. It does not have to be brief; whatever you would like.

Senator ALEXANDER. Thank you.

These are the points that I would like to make. I very much support nuclear energy as an option for us in the United States. It ought to be a major component of our National Energy Policy. I am from a part of the country, Tennessee, which has a big clean air problem and one of the surest ways to clean our air is to produce more of our electricity from nuclear power. We get 20 percent of that from TVA right now and I support TVA's effort to continue to expand nuclear power in the area. So I support the administration on that.

I am concerned about a couple of things. One is I want to make sure that we have sufficient resources in the budget, Mr.

McSlarrow, to reach the 2010 goal. We have consortia, as you have mentioned, who have stepped up and said that they want to work through this very expensive process of making sure that the regulations permit licensing. I look forward in the question and answer period to talking more about whether we have enough money there to send a clear signal to the industry that this is a real prospect, the opening of new plants.

The second area I would like to ask you about and I hope you will comment when the time comes has to do with the Idaho National Laboratory. I am all for its being the lead lab for nuclear research, but I wonder whether it is wise to take the plutonium 238 processing capabilities which we now have at Oak Ridge and the plutonium 238 encapsulating capacity which we now have at Los Alamos and move it to Idaho. I do not think that would be necessary in order for Idaho to fulfill its mission and I would be interested in the cost of that. It would seem to me that if it is likely to cost hundreds of millions of dollars to take that established capacity which is at Oak Ridge and Los Alamos and move it to Idaho, I would rather spend the money in Idaho to try to get a new, lower cost nuclear power plant going than to take existing capabilities that have existed over the last 30 years and replicate them there.

So those are the areas I would like to hear more about. I thank you for coming.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Bayh.

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

Senator BAYH. Just very briefly, Mr. Chairman. I thank you for holding this hearing.

I arrived at this subject as something of an agnostic, but am interested in the role that nuclear power can play in addressing two of the big issues of our time. The first is increased energy independence for our country. This is a significant national security issue, the significance of which we are reminded of every day with most of the world's energy supplies residing in fairly unstable places.

The second is the issue of global warming and the possible contribution that an appropriate use of nuclear power as a part of our Nation's energy mix can make in contributing toward that.

The final factor would be affordability. With natural gas and other energy sources increasing in cost, I am interested in the role that nuclear power can play in perhaps lending some stability to affordable energy sources for our country.

So I am here to listen and learn, not to speak, but I thank you for affording us all this opportunity.

The CHAIRMAN. Thank you very much.

Senator Bunning.

STATEMENT OF HON. JIM BUNNING, U.S. SENATOR FROM KENTUCKY

Senator BUNNING. Thank you, Mr. Chairman. I am pleased that we are having this hearing today on the role of nuclear power in

our National Energy Policy. It is important that we remain focused on the need to increase our domestic energy production and lessen our dependency on foreign national, such as the Middle East, foreign nations.

The need to increase our own production of energy has never been more important than now. This hearing is especially important because of the high price of oil and natural gas that we are experiencing. This Nation needs to diversify its energy resources, including using energy from coal, oil, gas, and nuclear energy.

I look forward to hearing from our witnesses today about the use of nuclear power and a means to diversify and increase our domestic energy sources. I thank the witnesses for appearing and I will question our No. 1 witness, a little later on, on why it has been since 1973 that we have not had a new nuclear power plant started.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator.

We are going to now proceed to some questions and I am very hopeful everybody will have some. I do think it is very important for our committee that we get an opinion as soon as we can, as valid as we can make it, as to what the impact of the circuit court decision is on nuclear power. I am not sure everybody knows that last week there was a very, very significant ruling by the circuit court up here regarding how many years out in the future we must provide this facility at Yucca Mountain, how many years out in the future do we have to provide for safety.

We were doing 10,000 years because that is about all we could model. They leave the impression that it might have to be 300,000 years, which seems impossible.

But let me ask a couple of questions so we get the record straight. What percentage of the electric power does France get from nuclear power generation?

Mr. MCSLARROW. It is about 75 percent.

The CHAIRMAN. 75 percent of France's power comes from that. They have interim storage of their nuclear waste, is that correct?

Mr. MCSLARROW. Correct.

The CHAIRMAN. Have you ever seen that?

Mr. MCSLARROW. I have not personally seen it, no.

The CHAIRMAN. I would like to just say on the record that I have seen it, and you would not know that you were there. You get into a building that looks much like a junior high school in America, a big one, a big junior high, and you walk in and the floor is kind of glassy. And you ask, where is the waste, and they say: Look down. And you look down and you are standing on it.

It is encapsulated in glass tubes and then glass-filled, and then glass on the top, and you can walk all over it. There is no radiation emitted. And that will last 75 years and they figure they will be looking for other ways, and they proceeded to have 75 percent, while we here in America decided that our way to store it was to put it in the ground permanently and that is the law, that we are going to get there some day.

Rather difficult so far. That opinion is going to require that Congress act in certain ways, I am sure.

Senator Bayh raised the issue of is there enough money in the budget to keep this going, or who asked that? Senator Alexander. So let me ask you right now, Mr. Secretary. In spite of the decision, it is your opinion, is it not, that if we fund this the funding can be used and the project can continue in spite of this decision; is that correct?

Mr. MCSLARROW. Absolutely, Mr. Chairman.

The CHAIRMAN. That is because you are proceeding to develop it, but you are not yet licensing it; is that correct?

Mr. MCSLARROW. We are at the stage right now where we are preparing a license application by the end of the year, and we will meet that deadline. There is a lot of useful work to be done and that is what the funding requirements in the next couple of years would be devoted to.

The CHAIRMAN. Well, Mr. Secretary, I am in the enviable or unenviable position, whichever it may be, of chairing this committee, which has some authorizing power with reference to paying for Yucca, which I was not aware of, but it is there and I will discuss that in a paper with all of you as to what that is.

But second, I chair the subcommittee that pays for this, the Energy and Water. So I want to ask you, based on all of the problems we have shared with you, is there sufficient money in the budget to pay for the next stage of the evolution of this project?

Mr. MCSLARROW. There is, if the President's request is met. If it is below that, I cannot say. It is a year for year slip, but it will obviously have some impacts. The request of $880 million, that is the $131 million from the defense account plus the $749 million included in the administration's reclassification proposal, keeps us on track to take waste beginning in 2010.

The CHAIRMAN. I want to make it clear, and then I will yield to Senator Bingaman. I have some additional questions, but I may just submit them to you. I want to make it clear that I blame no one, but the way the budget was prepared took $500 million off budget to pay for Yucca. Our budget process do not permit us to do that, does not permit us to do that. So what we have to do is take the regular budget for Energy and Water and take that money out of it to pay for a huge portion of Yucca.

That is almost impossible from the adding up of the numbers as to how it can be done. So we are looking everywhere we can to find some way to do that.

But his answer begs the question. The budget has the money in, but does it have it in there in a way that we can spend it? The answer is probably no.

Senator Bingaman.

Senator BINGAMAN. Thank you very much.

Mr. Secretary, as I understand what the court of appeals ruled this last Friday, they basically said that under the law EPA is required to establish a standard that is, quote, "based upon and consistent with the National Academy report." The EPA had established what they thought was a standard that was based upon and consistent with the report, and the court said, no, it is not, because the academy report does not permit you to establish a standard that contemplates 10,000 years.

Is it your view that it is possible for EPA now to go back and develop a workable standard that is consistent with that National Academy report?

Mr. MCSLARROW. First let me say, we are obviously evaluating a lot of options. That would be one of them. We have had essentially 1 full business day to review this opinion, but let me just give you sort of the initial cut at this. I told Senator Domenici yesterday, I am a congenital optimist about Yucca Mountain and I guess I have to be in this job. But everybody said we could not get to the point we are at right now in terms of the Congress having approved the siting solution.

This court case—and it is often lost sight, and I realize opponents are going to try to make hay of what they got. This court case was an enormous victory. Everything regarding site selection and everything regarding the standards that the EPA and the NRC did was upheld, except for one thing. And other than that one thing, the 10,000-year period that you have identified, it is clear to me that the 10,000-year period with the 15 millirem standard, which is what the EPA and the NRC established, has been upheld. So all the work that is devoted to that in the license application is still very useful and we will proceed, as I said before, to file a license application.

What you do after the 10,000-year period is the question mark that is presented by the court case. Just to give you an example of what we are dealing with, in the final environmental impact statement produced on the Yucca Mountain project by the Department, we estimated a mean peak dose just to show magnitude, occurring in 480,000 years, of 150 millirem. Just to put that in context, 150 millirem is roughly half of the average background radiation in the United States.

So based on what I know right now, I see no technical reason why EPA or anybody else cannot do something that allows us to proceed and deals with the post-10,000 year period. But obviously those are decisions that will be the product of consultation among our agencies and with the Congress.

Senator BINGAMAN. So you are saying that it may be possible for EPA to revise its standard to comply with whatever the court has said and there will be no need to change the law?

Mr. MCSLARROW. That is possible. I do not know that. I know that is certainly a possibility.

Senator BINGAMAN. And your intent is to go ahead and develop your application for a license on the assumption that if a new standard comes forth from EPA you would then change the application to reflect that, even if that occurred once the initial application had been filed?

Mr. MCSLARROW. Right. I think it is unlikely, not impossible perhaps, but unlikely that anything that might occur on a post-10,000 year standard would cause us to revisit the first 10,000 years. So I would view it as possible that even as we work through an application and a license we might have to supplement it with new performance data according to whatever new standards might be brought to bear.

Senator BINGAMAN. You referred in your testimony to the Nuclear Power 2010 program and the value of that. As I read the fis-

cal year 2005 budget request, it proposes cuts to that program by almost 50 percent and states on page 398 of the budget volume, quote: "The Department has requested only minimal funding for fiscal year 2005 to enable the continuation of ongoing licensing demonstration and related analysis projects."

Could you explain why, if this Nuclear Power 2010 program is a priority, you are proposing to cut that program by 50 percent?

Mr. MCSLARROW. Sure. Of course, I remember that asterisk very well. It is a fair point, and I think what in bureaucratese was being said there is this. We started the NP2010 program because we thought it was vital that we move to new starts. We had to test the early site permitting process. We want to test the combined construction and operating license. We want to do the predesign certification.

All of these are the product of the new NRC rules, Part 52. We are well into the early site permitting process. It was not until last November that we issued a solicitation inviting the industry to come forward and tell us what they would be interested in doing in terms of testing out new designs and most importantly perhaps, testing the combined operating, construction and operating license.

So at the time we produced the budget we did not know what the answer was. Now we have some sense of the answer. We have three consortia that have come in the door. One of them we have actually agreed to fund. It was a much smaller amount. It was TVA, looking at a study of the ABWR down at Bellefonte. The other two are very substantial. I cannot go into details because of the procurement sensitivity, but these are real serious proposals. We are in the midst of evaluating them right now.

I would expect that now we have, all of us, new data and the industry has stepped forward to say what it is they are interested in doing, that this will have an effect certainly on next year's budget. But at the time we did not have that data.

Senator BINGAMAN. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Bingaman, I might say, although it is preliminary, we do intend to address the issue that you raised in the appropriation bill. So whether they put it in or not, we are looking at it as a must.

Before I yield to Senator Craig, I have one follow-up question to something you have been saying. Can you tell us how the research that you are doing on the Advanced Fuel Cycle Program is progressing and how it could address issues associated with licensing of a high-level waste repository?

Mr. MCSLARROW. Well, Mr. Chairman, I am not a nuclear engineer, although I have stayed at a Holiday Inn Express. I will give it my best shot.

The CHAIRMAN. Go ahead.

Mr. MCSLARROW. As I understand it, when you are dealing with disposal long-term of waste in a repository you really have three issues: the issue of volume, the issue of heat, and the issue of radiotoxicity. These are all the challenges that the Yucca Mountain project is currently grappling with. The Advanced Fuel Cycle Initiative has in terms of the research that we are doing an ability to address all three of those.

You can pursue a UREX, uranium extraction, process to pull useful uranium out of spent fuel—a lot of people do not realize that in a spent fuel rod about 96 percent is uranium—and either re-use it or dispose of it as class C waste. You can use other technologies to separate out the plutonium or the long-term actinides, which are one of the causes of the heat and certainly one of the drivers for the radiotoxicity. And you can burn it as fuel in a light water reactor or, more importantly, if you use a fast spectrum reactor, you can actually burn it and transmute it, so that you take what is essentially, we have used the term, a 300,000-year problem today, take what is a 300,000-year problem and turn it into something that is only several thousand years, which is a much more manageable deal from an engineering point of view.

We feel very positive about AFCI and what we have already learned to date. For example, we have already proved on the laboratory scale—we have not scaled up yet, but in the laboratory—that we can extract the uranium in a way that is proliferation-resistant. This is the opposite of what we did for the weapons program. So we are very excited about the opportunities.

The CHAIRMAN. This is called transmutation, right?

Mr. MCSLARROW. Part of it, yes, sir.

The CHAIRMAN. Part of it is.

Did he explain it right, Dr. Chu? You are the expert. You are the engineer. Please assist him. Was it pretty good?

Dr. CHU. Yes.

The CHAIRMAN. You taught him well?

Dr. CHU. Yes.

The CHAIRMAN. Senator Craig.

Mr. MCSLARROW. You will get that raise I promised you earlier, Margaret.

[Laughter.]

Senator CRAIG. Then apparently between the checking in and the checking out of the Express Holiday Inn you did learn a bit. Obviously by that last answer you did.

Kyle, how will DOE both rebuild the Idaho lab infrastructure to meet the goals as you now plan it and perform actual nuclear research with what we call a flat budget through 2009? How do you get there? You began some of that explanation with Senator Bingaman. Expand on that if you would.

Mr. MCSLARROW. I think one of the things about Idaho is we are trying to do many things at once. Obviously we are trying to—we are trying to separate out the mission so that the cleanup program, which is the RFE that we are currently developing right now, is focused just on cleanup. One of the reasons we transferred this to nuclear energy as the program office was we wanted the site to know what its mission was, not that the cleanup is not important. So that is the first step.

The second step was to do, as we proposed in the RFP, to combine INL, currently INEEL and Argonne West, and from the efficiencies of the combination, not just infrastructure and logistical efficiencies but efficiencies we believe that are intellectual, to build a powerhouse capability in terms of that kind of work. Then you have got programs, Generation IV, the nuclear-hydrogen program, the NGNP, which has been the subject of the expressions of inter-

est that we just sent out, that are not going to be exclusively funded at Idaho, because obviously we are going to call on the other labs who have expertise to be participants in this, but there is going to be a funding stream that relates to that.

I think the biggest problem we have had in 2005—this is reflected in the budget—was to ensure that we dealt with the transition costs and we dealt with some of the early infrastructure costs—because they have not, frankly, been attended to in the past—in the 2005 budget, which kept the nuclear R&D side from being as high probably as we want it to be. But we felt it was important to make sure that we lay the foundation for the future of this lab there.

I think with the nature of Generation IV, the hydrogen program, and most particularly the NGNP, there is a lot of uncertainty there. I mean, we have flat budgets for just about everything in the Federal budget documents. It does not actually reflect what happens the following year.

Part of this too is going to be informed by what we discover this year. Obviously, you are going to have an important role in terms of what money is actually appropriated. But I believe that we have laid the foundation and are in the middle of establishing something that will ensure not just a thriving, but an exciting, future for the Idaho National Laboratory.

Senator CRAIG. Beyond the restructuring and the RFP's, one of the things that is essential in developing the NGNP, as you have just mentioned, is material development. The Idaho Advanced Test Reactor has been in operation since 1968 and most believe it will be essential to material development in the NGNP. Yet the fuel for the ATR is in danger of no longer being manufactured.

The question is is DOE budgeting for fuel purchases and major system maintenance that will be needed to sustain the test reactor toward this new materials development that will be necessary?

Mr. MCSLARROW. Well, Dr. Magwood just whispered in my ear that that is something we are conscious of, that we are looking at in terms of the 2006 budget.

Senator CRAIG. It will be essential.

According to the Nuclear Regulatory Commission's regulations, for any reactor design that differs significantly from current light water reactors the NRC will require testing of an appropriately sited full-sized prototype for the design over a significant range of normal operating conditions, transient conditions, and specific accident sequences. Now I am going to test how much you learned between the checking in and the checking out.

In order to ever deploy advanced reactors in this country, we would really have to undertake a project like, I think, the Idaho Advanced Reactor Demonstration would be. Or would we not? That is the question.

Mr. MCSLARROW. I think we do. But over and above what the NRC regulations are, I think we do simply as a practical matter. The rest of the designs that we have been talking about that we would be testing against the design certification are so-called Generation III Plus. Now we are talking about something that is Generation IV. It is really new. And the NGNP, which is a very high

temperature reactor, is sort of the one we have selected to really pursue.

Our goal, at least in terms of the Department, what we have recommended to Congress, has been to produce a prototype, a demonstration plant, that can be commercialized. Obviously it will have important benefits in terms of the research that is done there and certainly all the research on technology that leads up to it. But ultimately it is to actually produce something that can receive a license, that can demonstrate the qualities that we want it to have and be commercialized so we move to the next generation.

I mean, that is why we call it the Next Generation Nuclear Plant. So I think as a practical matter it would be very odd, I think, if we ended up with a design certification of a Generation IV design and then we just expected the industry to step forward and start building them without one having been built. And I think that of necessity it requires government and industry partnering.

Senator CRAIG. And also to have it licensed by the Nuclear Regulatory Commission.

Mr. MCSLARROW. Correct.

Senator CRAIG. Because I think we are also concerned about, you mentioned in your opening statement, uniformity of licensing and licensing process. And based on current licensing procedure, ultimately there has to be that model in place functioning.

Mr. MCSLARROW. Correct.

Senator CRAIG. Thank you.

The CHAIRMAN. Senator Alexander.

Senator ALEXANDER. Thank you Mr. Chairman.

First I wanted to say this committee also has a lot to do with the Forest Service and the National Park Service, and on this past weekend I took a 13-mile bicycle ride between Idaho and Montana on a trail that Senator Craig helped to create. And I just want to congratulate him for that. It is a rails-to-trails.

Senator CRAIG. Well, Lamar, that is a beautiful example of an old rail right-of-way that the Forest Service wanted to condemn and walk away from. It has how many tunnels that you trafficked through?

Senator ALEXANDER. We went through about seven tunnels and over some of the most fantastic trestles in the country. It is where the old Sky-Top used to go from Chicago to Tacoma and I am glad you saved it.

Senator CRAIG. And we saved it and it has now become one of the premier mountain biking paths in the western world. That is my commercial for the day.

Senator ALEXANDER. I am grateful for it.

Senator CRAIG. Thank you very much, Lamar.

Senator ALEXANDER. Now I want to talk about Idaho some more in just a minute, on the lab. But first I want to reemphasize what I said earlier. I do not see any alternative to, in the next 10 to 15 years especially, to nuclear power if we want to be energy independent and if we want clean air and we want reasonable cost.

I very much hope that we can find a way to sequester carbon from burning coal and have coal gasification. I hope that happens, and I applaud your efforts to push us in that direction. I would like to find some new natural gas sources on non-protected Federal

lands. But 20 percent of our energy today comes from nuclear power. As Senator Domenici said, France is taking our technology, Japan is taking our technology, and they are using it and they are cleaning their air and they are producing power, and we should do the same.

I am glad you have your 2010 project. I am glad you have already funded the TVA consortium. I hope that we have enough money to push that ahead. I appreciate Senator Bingaman's questions on that.

Let me go to one set of questions I have to try to understand what the Department's proposals are for the plutonium 238. I do not want to be misunderstood. We have the Idaho laboratory and its mission as I understand it is to help us find a way to create new commercial nuclear power plants so we can duplicate them and replicate them in a McDonald's fashion. It will be cheaper and easier to do that. And we need to focus that somewhere and Idaho is our place to do that. That is where we want to do it, and we need to put as much money into that and the 2010 project, is to help us get through the regulatory part of the process so people can actually get a license to build such plants.

Now comes the proposal to consolidate the plutonium 238 program at Oak Ridge and at Los Alamos, where they have got a long history of processing plutonium 238 from irradiated targets at Oak Ridge and then shipping it to Los Alamos, where they then encapsulate it. Why does that need to be moved to Idaho? Will not that cost several hundred millions of dollars? And if so, would it not be better to spend that several hundred millions of dollars to help push ahead with the Idaho mission of creating this new commercial nuclear power plant?

Mr. MCSLARROW. The quick answer—and we will get you something more specific—is I think it will cost a couple hundred million dollars total life cycle to stand up the complete ability to produce the Pu-238.

This is not a search for a mission for Idaho National Lab. I just want to be clear about that up front. It made sense to us for the following reasons. First, we actually do not have the capability of producing plutonium 238 today. We are just drawing on inventory as it stands right now. We have not yet done the production facility at Oak Ridge. That is the plan currently that we propose to change.

At Los Alamos, as you mentioned, you have got the processing, and then the last part is assembling the elements of this into useful national security or space systems. That has already been moved to Idaho.

So those are the three functions. But when you produce plutonium 238 what we had in mind was essentially bouncing back and forth with irradiated targets from Oak Ridge to Idaho anyway. When you look at all of the shipments suddenly we were talking about, which of course have to be secure transport, at a certain point we realized, given that we have already moved the assembly operations to Idaho, given that we would like to free up space at TA-55 in Los Alamos, and given the constraints that we need the transportation units to do a variety of different things, not just this program, it made sense to us to consolidate it in one place.

So it is partly driven by the transportation costs, it is partly driven by security concerns. It is partly driven by what we believe ultimately would be efficiencies in that operation.

Senator ALEXANDER. I appreciate that and would like to learn more about that. It is not necessary—I am trying not just to be parochial about this. In the Oak Ridge case, for example, with the designation of Oak Ridge as the lead agency in helping to recapture high-speed computing, it was not necessary to move all of the computing operations there. Argonne and other laboratories will be in partnership. Many universities will be in partnership with that effort.

So I guess my caution would be that just because an operation is relevant to the mission of the Idaho laboratory does not mean it all needs to be moved there if it is not cost efficient to do that. I would just like to wave a yellow flag and ask for more information on that process. And if it is true that it does not have to be there and we could take the same amount of money and accelerate the mission in Idaho, then I think that ought to be considered. That is my point.

Mr. MCSLARROW. We will be happy to provide that for you.

[The information follows:]

The Department has the responsibility to maintain the infrastructure required to provide plutonium-238-fueled radioisotope power systems to various Federal government agencies in support of important national science and security missions. Unfortunately, our infrastructure to produce this material was dismantled in the 1980s after the reactors at the Savannah River Site were shut down over safety concerns. Since that time, we have relied on a dwindling inventory of this material to support important national security missions.

To address the need to produce new Pu-238 for this inventory, we established a plan to put in place a new capability at Oak Ridge National Laboratory to fabricate and process reactor targets needed to make this material. We also planned to conduct irradiation of these targets in the Advanced Test Reactor in Idaho; continue the existing program of encapsulating Pu-238 into pellets at the Los Alamos National Laboratory; and conduct final testing and assembly of the power systems at the Mound Plant in Ohio.

After the events of September 11, 2001, two changes occurred that altered the status of our Pu-238 activities. First, the demand for our power systems by national security elements of the United States government increased significantly. As a result, our inventory will be depleted by the end of the decade. Second, the effort to assure the security of this material has become more intensive. The safety of the public and, therefore, the security of the material, is the highest priority of the Department's Pu-238 activities. Pursuant to this, the Department relocated the power system testing and assembly effort from the Mound Plant to a more secure location in Idaho.

Similarly, our original plan to move target material to the Oak Ridge campus has had to change. We are now proposing to relocate the material to a secure site in Idaho, where it can be more effectively protected. We must also revisit the location of the Pu-238 processing effort.

The consolidation of plutonium-238 operations would significantly increase security of the material and would enhance program flexibility, while reducing future secure transportation requirements and risks associated with regularly transporting this nuclear material across the United States. Relocating the processing and encapsulation function currently performed at the Los Alamos National Laboratory would also free up facility space for future national security missions by the National Nuclear Security Administration. Including the production function as part of a consolidation effort at Idaho would also not impact current employment at Oak Ridge since the capability does not currently exist at that site and would have to be put in place.

Nevertheless, we intend to conduct an open, public process in deciding where the processing mission will be located. We will determine whether it should be consolidated with other Pu-238 missions in Idaho or remain in Oak Ridge. Our preliminary assessment of the costs, reliability, and security issues points to consolidation in

Idaho, but we intend to conduct a complete National Environmental Policy Act review before making a final decision.

Senator ALEXANDER. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Bunning.

Senator BUNNING. Thank you, Mr. Chairman.

I want to get back to the administration's fiscal year 2005 budget. In your budget for nuclear energy research and development there is $96 million, $96 million.

Mr. MCSLARROW. Correct.

Senator BUNNING. That is $34 million less than provided in fiscal year allotment last year.

Mr. MCSLARROW. Right.

Senator BUNNING. Why did the Department of Energy decide to cut nuclear energy research and development?

Mr. MCSLARROW. The answer is much the same as my first budget hearing that we had here in February, which was this was a tight budget across the board. I think you all have heard this a million times by now, but the President recommended a budget to you that focused increases on defense and homeland security. Everything else was tight. It is not just nuclear energy. Everything at the Department was very tight.

The budget actually for the Office of Nuclear Energy went up, slightly, but it went up. There were other programs that went down. It did go down because it was a tight budget year. There is no question about it. It is not centered on nuclear energy per se. It is not sending a message about that, because, as I say, we have had these conversations about science and fossil and everything else.

What is important I think in terms of the commitment that we and this committee and members of this committee have shown is—I mentioned in my testimony that in fiscal year 1998 the budget for nuclear energy, the research and development portion was zero. If you average out all of the budgets requested by the previous administration prior to this President's National Energy Policy, it is a little below $40 million. If you average our budgets that we submitted after the President's energy plan, it is slightly below $100 million. It has more than doubled. So it is very robust. And like everything else, we might want more money, but we have the budget realities that we are dealing with.

But again, it is not centered on nuclear energy per se.

Senator BUNNING. Mr. Secretary, that is very well-meaning and nice-sounding and everything, but it does not get to the problem. If we do not expend more dollars in research and development of nuclear power, we are never, never going to open another nuclear power plant, because, as you know and I talked about it before, the last completed nuclear power plant in the United States of America was in 1973. That is longer than I care to remember and it should be longer than the Department of Energy ever cares to remember.

If we are going to get a new nuclear power plant built, the Federal Government is going to have to subsidize that nuclear power plant. We had it in our energy bill. Unfortunately, it was filibustered and it did not go forward. We never got cloture.

But I am telling you, and you know it, if we do not subsidize the development of nuclear power and a fourth generation—I have a son who works in a nuclear power plant in Clinton, Illinois, and they are constantly upgrading that plant so that the Nuclear Regulatory Commission does not come in and shut them down, and it lasts about 2 years.

So I am begging you as part of the Department of Energy to do something about that. The only way we can do something about that is to put more dollars into research and development to make sure that investors, investor-owned utilities, private enterprise, and the Federal Government partner in the development of stage four or whatever we want to call it, phase four, nuclear energy production.

And please, do not tell me about how many dollars we have got going in. It is not enough.

Mr. MCSLARROW. OK.

The CHAIRMAN. Senator, I might tell you I do not know where we will go this year with appropriations, but the Subcommittee on Energy and Water has taken your point and we do fund what you ask for, even though it is not in the President's budget.

Senator BUNNING. That is very good, Senator, chairman, and I hope to gosh that the Senate has the wisdom to pass that when it comes to the floor.

The CHAIRMAN. I want to also say for the record, the Senator talks about subsidy. I want to explain what the energy bill had in it. The energy bill followed the recommendations of the best experts around, and what we put in was production tax credits, production tax credits. They are the same proportionately as we gave to wind energy, as we gave to solar energy, as we gave to geothermal energy. So they all fit in with the same production tax credits that would have been part of the bill.

I am not critical of anyone. Most everybody would have been for those, even though the bill got caught up in an MTBE issue. So I just wanted to make sure that you knew that.

Senator Craig, do you have anything further?

Senator CRAIG. Thank you very much, Mr. Chairman.

Kyle, last year DOE tasked an independent technology review group to evaluate design features and technology risks for the NGNP. This was followed on—this was follow-on work to the development of functional requirements for the NGNP. All of this work was part of the evolution of DOE's Generation IV program, as you have already explained.

This review group was made up of an international cross-section of major industry and utility executives. Their task was to identify an appropriate level of technology risk for the project.

The question is, does DOE think the independent review, technology review group report, could be used as technical guidance for the development of a new reactor and what is the status of that report?

Mr. MCSLARROW. There is no question that it would be available for use and I think our expectation is that we would certainly make it available as guidance to the project integrator, which is the subject of the EOI that went out recently. The status is it is still in draft and it is completed soon, in weeks, is the status.

Senator CRAIG. How long is "soon"?

Mr. MCSLARROW. Weeks. Does next month work any better?

Senator CRAIG. I do not know. We will not be here next month, so you will probably have until September 1.

Mr. MCSLARROW. September you will have it.

Senator CRAIG. All right. But that report will be valuable, I think, for overall understanding.

Some of the industry comments on the expressions of interest have been shared with me for information. One company that has an extremely long history with nuclear power in this country commented as follows: "DOE's conceptual strategy, which relies heavily on a single project integrator, will result in higher than necessary costs, a longer than necessary schedule, and is unlikely to lead to a plant being built."

The reason I selected that quote, because I thought it was very blunt and direct, but more importantly it came from an industry source that has phenomenal credibility in the construction of nuclear plants.

The question is, how did DOE justify the use of a project integrator? What has this approach been used—where has this approach been used in DOE in similar projects in the past?

Mr. MCSLARROW. As an aside—I do not think we need to get into this because I will take it on its own merits. But I have obviously heard comments that are diametrically the opposite.

The important thing about the expression of interest, where we lay out essentially the idea that a project integrator, a private company, would essentially form a consortium that would go from the early stages through obtaining a license and construction of an NGNP, is a product of several things. First, you and Senator Domenici wrote the Department a letter in November of last year where you said: We do not view the entity responsible for the NGNP as something that should come within the work scope of Idaho National Laboratory, No. 1. No. 2, we do not think it should be sole sourced. No. 3, we believe that when you get into the technology you should ensure that there is competition between at least two technologies and then a down-select to an ultimate one.

Obviously, we attach great weight to what you have to say. As we thought our way through that, we tried to design something that would, even if it is housed and obviously lashed up extremely tightly with the M&O contractor at Idaho National Lab, that would allow us to think through before we leap into the process of how the private sector, if we are going to commercialize a plant like this, how the private sector viewed this from the very get-go.

You asked a question about if we have done this in the past. My guess is no. In my role as Deputy Secretary and the acquisition executive for the Department, I sort of deal with legacy issues when it comes to contracts all the time, and they are not pretty. My sense of it is that we very often cannot distinguish between when we are doing acquisition and when we are partnering with industry, when industry should take the lead.

So the idea of the project integrator was to have somebody in industry who has got those kinds of capabilities who could put it all together. Now, they do not have free rein. Obviously, what we have

described is something where every step of the way they have to work with the Department. And there are going to be offramps.

But that is the concept. Now, that said, we have not locked this in by any means. There is no pride of authorship here at all. This is a concept we have thrown out for comment. We are getting comments, obviously blunt ones like that, but we are getting lots of comments. I expect that, based on what I already know about what people are saying, we are going to end up tailoring this somewhat.

It was not—again, I wanted to be as careful as possible to think through this. I want to get this right. So we welcome that kind of input.

Senator CRAIG. Could I do a follow-on to that question?

The CHAIRMAN. Please.

Senator CRAIG. While, because Idaho is tied to this, the questions may sound parochial, they are not. I think all of us on this committee want to make sure that we do it right in our relationship with industry. This is something that is developing a great deal of attention, not only nationally but internationally.

The capabilities of the project integrator are listed in the EOI as management, integrate research, manage projects within the cost and schedule, evaluate competing technologies, organize an international team. My question would be, will not the new management and operating contractor that the DOE is hiring to run the Idaho National Lab have these capabilities? Should they not have these capabilities, no matter where this facility might be constructed?

I say that because I do not have the letter in front of me, but your comments in last November when talking about the INL lab contractor should not build in GMP, but that their role is in no way slighted. In other words, they had to have these capabilities and talents. So when I am sitting here looking at this, I look at this as almost a duplication of bureaucracy or management bureaucracy, management team. Maybe "bureaucracy" is too negative to use. And where do we get by doing this kind of double layering, if you will, when we ought to be hiring somebody with these kinds of talents from the beginning through the end?

Mr. MCSLARROW. Well, I will go back and look at the letter, too. I mean, my recollection is that what you all had said was separate it from the Idaho contract so that you would essentially have two things, but maybe we misunderstood.

But there is some duplication. I do not think we thought that was a bad idea in this instance because the M&O contractor is going to have a lot on its plate. It is going to be responsible for leading and integrating with all the other labs and the important work that they are doing to support all of these programs.

Obviously, we have not said this today, but there are lots of things outside of nuclear energy that are happening at Idaho on the national security and homeland security front too that the M&O has to focus on. The nuclear-hydrogen program is going to be a big part and a big program at the Idaho National Lab.

On the NGNP, obviously we are at the very beginning stages. No one, including Congress, has made a decision we are actually going to construct it, but we are going to start driving in that direction. But the NGNP potentially is so huge that I think, just my own

opinion is, I do think it merits a separate program structure with direct supervision right out of Bill Magwood's office. I think it is that important.

It is what we are doing with Future Gen on the coal side. it is a big deal. It is a Presidential initiative, and so it is being managed—obviously, in the case of Future Gen, it is lashed up very closely with NETL—in Idaho's case, because you are actually potentially talking about siting the facility there and all the research is there.

I think to the outside observer it is possible that you would not even know the difference between INL, NGNP. It would all seem like the same. But I think in terms of building, producing and managing a project, I think that has got to be seamless. I do not think anybody should be confused about what the mission is on that. I think the visibility suggests, although I am open to other arguments, suggests that that ought to be managed right out of the headquarters department.

Senator CRAIG. Further questions? I have got some more, but go ahead.

The CHAIRMAN. Thank you. Let me say, Senator Bingaman wanted to ask some and then I have a couple. Senator Bingaman.

Senator BINGAMAN. Thank you very much.

Let me ask about two issues. One is this Nuclear Energy Research Initiative. That has generally been a successful program to permit far-ranging R&D in the nuclear science. The proposal in the fiscal year 2005 budget, is to zero that out, subsume it under the advanced fuel cycle initiative, whose purpose is to reprocess and recycle fuel at the national laboratories. Can you just explain briefly what steps are being taken to ensure that universities can continue to play an important role in nuclear energy research in light of this proposal?

Mr. MCSLARROW. Sure. First, there is good news here. The amount of money that is going to go to universities is under our budget substantially going to increase. It is true that the NERI line was zero funded. But we are proposing—and I have talked to Dr. Magwood and his folks and I know they have the plans. We are proposing as part of those plans that we are going to spend $7 million in 2005 going directly to universities.

What we did was take it out of the NERI line item, and we have now—we want these activities at the universities to support our work, whether it is Gen IV or the nuclear-hydrogen program or AFCI. The big R&D program lines are what we want to support. So we wanted to wrap it in. And it in no way diminishes the importance of universities. As I said, it enhances it.

In addition, of course, you have got the universities research and assistance line item that will continue, both the assistance for research reactors and the grants and the fellowships that have been the case in the past, at basically the same funding we got in 2004.

Senator BINGAMAN. Thank you.

One other issue, which I know you would be disappointed if I did not ask about. Both Senator Domenici and I think some others have asked you nearly a year ago, in September of last year, about the plans with regard to polygraph exams in the Department. You stated there—this is in response to a written question. You said:

"Before I leave the mandatory screening program, let me mention that if a revised rule is proposed and promulgated I believe it is important we proceed with full implementation of that rule expeditiously so that the Secretary is in a position to make the certification required in the fiscal year 2002 defense authorization bill regarding the implementation of the new program."

Could you tell us the status of the polygraph rule and the revisions that you proposed to the committee?

Mr. MCSLARROW. Yes. This is one reason why, after 3½ years, I really hate government. I testified before you and I told you what the plan was going to be, and then when I testified here in February you asked me where it was. I said we were just about to get it to OMB for inter-agency clearance. Inter-agency clearance has just completed. It is now back with us.

I expect very soon, now that it is back within my control that we will get it out. And I am as frustrated by the length of time as you are on this.

Senator BINGAMAN. Thank you very much, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Bingaman.

Senator Craig, I am going to get to you and let you ask as many questions as you would like, if you do not mind my leaving while you do that. I have to be in another place.

Let me just close by saying we sit here today with all these accolades aimed at the need for and the propriety of nuclear energy in our future. We know what others have done and we know what we have done. We know what we ought to be doing and we know what we were doing. But as we sit here today a little statute that was inserted in the Energy Policy Act—Senator Bennett Johnston was presiding then—and it said that in doing this work the Environmental Protection Agency should be guided by the National Academy of Science.

Now, the National Academy of Science talked about when the maximum exposure would occur, and nobody but nobody expected that to—270,000 years is one interpretation. Even a million years is another interpretation. Nobody thought that anybody in the world would have to meet that kind of standard up front in starting the repository process.

The court has nonetheless said that the EPA failed to consider the National Academy's report. I want to suggest that this is an ominous situation. It is terrifically important that we in some way find a solution to this. The entire nuclear energy production in the United States could stand or fall on this interpretation, because if we cannot proceed with Yucca, soon across this land the States will find that there is no way to take care of the wastes that are in every State in America and that they are going to have to keep them. And nobody wants to do that, and there might be some statute compliance required that says they cannot continue to produce nuclear power until they have solved this.

So I want to make sure that as we leave this meeting today, we could have an array of people telling us the consequences and we could have a few people saying rah, rah, rah, it means the end of nuclear power. But I believe concertedly, working with everyone, we have to find a way to be more realistic.

For those who do not want it, this is not a way to have a victory. They think so, but this is not a victory; this is the destruction of an industry and a source of energy that is now 20 percent of America's needs. We even have, and I read into the record, one of the most significant environmentalists based upon global warming saying it is imperative that we move to nuclear energy quickly and many, many nuclear power plants, because the time is too short, says he, to use the other energy sources we have all been talking about. They cannot get the job done.

Now, that is probably right whether you are worried about global warming or whether you are worried about diversification of energy for the United States, less reliance upon foreigners. And here we sit.

So I want the Department to know that this chairman is interested in trying to find a solution, and I think we have a compelling number of Senators on this committee who would like to find a solution. I am not sure we can because we may not have the authority. But we have not looked at all the authority we have on this committee either. We will be doing that.

So Mr. Secretary, I thank you. I did want to say, with reference to the laboratory in Idaho, that I do not believe 2020 is right. I think it is too far in the future. We have to expedite that. We have to get that done quicker. I am not saying that because Larry Craig is here. It is just too long for what we are trying to do and how important it is in terms of where we are going.

So I want to leave you and your people with my firm belief that we have got to find different ways to get there faster. I am sure that is good news to Larry Craig, but I did not say it for Idaho. I said it because I really believe doing that reactor is terribly, terribly important.

I also want to say another thing that I forgot to say. There are so many people saying we ought to have new cars, cars that run on hydrogen. And there is this great big hoopla that that might be really good. Well, I want to tell you, most experts say you cannot produce enough of that to run the cars in America without a nuclear power plant or more to generate the hydrogen that you need.

Now, if you want to keep saying we are going to have hydrogen cars and have a little experimental hydrogen around, that is fine. You might produce 10,000 or so and show them off. But you do not have a permanent supply without a nuclear power plant.

So everywhere you look it is imperative. I hate to make it so ominous, but I think it is. I really am worried that something very wrong has been done here and we must fix it.

Senator Craig.

Senator CRAIG. Mr. Chairman, before you leave, I appreciate your drawing attention to the importance of proceeding with Yucca Mountain as it relates to the industry and clean electricity. I have been a fairly regular attendee at climate change conferences around the world, and at the last one that we attended in Milan, Italy, last spring I found something most significant. Two of the countries I visited with that have already adopted the Kyoto Protocol and were supposedly driving their economies toward compliance by the reduction of the emission of greenhouse gases had to

openly admit that they were not going to meet those standards and probably could not ever meet those standards.

Japan was within, I believe, 7 percent of meeting those standards. Now their economy is coming back on line and they bumped themselves another 3 to 5 percent ahead of where they wanted to be. Italy is the same way.

Clearly, there is no question that providing abundance of energy is directly tied to the economy of countries and the ability of those countries to grow. And those two countries had to admit in conversation with me that as their economies came back on line their margin of getting to compliance had rapidly grown again and that they just did not know how they were going to get there, in all fairness, based on current technology, current energy production technology.

That is why future technologies and clean technologies are so critically important in those general concepts of climate change.

The CHAIRMAN. Also, Senator, that is why France can say to America, why do you not sign the treaty——

Senator CRAIG. Sure.

The CHAIRMAN [continued]. Because they can comply easily when 75 percent of their electricity comes from nuclear. They start off with none of the pollution or a very insignificant portion coming from the electric power generation, which is a pretty easy start. What if we did not have any. We would move in the direction of the numbers set by Kyoto, and we would say to other countries, why do you not join us. But we do not have it like France.

Senator CRAIG [presiding]. Mr. Chairman, I do have a couple of more questions. I will be short. Kyle, we appreciate your time here. I have others that I will ask that you respond to the record with.

In relation to Yucca Mountain—and you have talked about continuing to move there—I know that DOE must give advanced notice to potential layoffs and faces a deadline of later this month in relation to budget and all of that. Does DOE plan to request administrative flexibility from OMB regarding this layoff notice while Congress continues to work on finding a solution?

Mr. MCSLARROW. I do not think that is a bridge we have to cross yet. The Secretary identified this as a potential challenge I think a month or so ago in a letter to the Hill.

Senator CRAIG. It is not at the end of the fiscal year?

Mr. MCSLARROW. Well, it has changed since then because of the—as you point out, July 31 would be the 60 days that you would be required under the Warren Act.

Senator CRAIG. That is true.

Mr. MCSLARROW. What has changed since we notified people about this concern is I think we are much more comfortable, based on discussions with you and the leadership on the Senate side as well as on the House side, that we are going to get this resolved, even though if you look at the committee marks it may not reflect this. I think we are much more comfortable that ultimately we will have the kind of funding that takes us way beyond any need to think about RIF's.

So right now, for the time being we are just going to work with Congress. We are not going to have to go through that process. We

are just going to work with Congress to ensure that we get the funding stream that we have asked for.

Senator CRAIG. Well, that is our hope, too.

In the expression of interests list, some in my view—I should put it this way. In the expression of interest there are some very ambitious cost projections for the Advanced Reactor Demonstration. Were these cost goals based on comparable cutting edge energy research as they—well, first of all, what were they based on? I guess that is the first question I would want to ask.

Mr. MCSLARROW. There are several different ones.

Senator CRAIG. Let me put it this way. Are they based on a first of a kind research project? Can we do that in relation to what we are talking about is really the first of a kind, because we are out on the edge of technology again to some degree?

Mr. MCSLARROW. Yes and no. Yes in the sense, if you just take one of the goals it is to actually construct for $1,000 a kilowatt, with a goal to get down to $500 a kilowatt. So it is yes in the sense of $1,000 is completely doable for a first of a kind. It is a stretch goal. That is what we want to do, is challenge them, but ultimately to make it commercialized and successful there the $500 per kilowatt would be the stretch goal in terms of commercialization.

The other goals are essentially the production of hydrogen at a gasoline-equivalent cost of $1.50 a gallon, I think, and then the production of electricity, which is the other part obviously of the plant, at 1.5 cents a kilowatt-hour. Those are all aggressive. But in order for this to succeed in the commercial sector we think those are the goals that anybody who is doing this project has to at least achieve.

Senator CRAIG. Well, Mr. Secretary, thank you very much for being here this morning. I think for the value of our record it was extremely important that you be here, and we appreciate your testimony, and the full committee will stand adjourned.

[Whereupon, at 11:28 a.m., the hearing was adjourned.]

APPENDIX

RESPONSES TO ADDITIONAL QUESTIONS

NUCLEAR REGULATORY COMMISSION,
OFFICE OF CONGRESSIONAL AFFAIRS,
Washington, DC, September 14, 2004.

Hon. PETE V. DOMENICI,
Chairman, Committee on Energy and Natural Resources, U.S. Senate, Washington, DC.

DEAR MR. CHAIRMAN: I am responding to questions regarding changes in force-on-force exercises at power reactor facilities licensed by the Nuclear Regulatory Commission (NRC). Given the nature of these questions, they were referred to the NRC from a list of questions submitted for the record to the Department of Energy's Deputy Secretary, Kyle McSlarrow, following his appearance before the Senate Committee on Energy and Natural Resources on July 13, 2004.

The NRC's responses to the four post-hearing questions from Senator Byron Dorgan are enclosed. If additional information is needed, please do not hesitate to let me know.

Sincerely,

DENNIS K. RATHBURN,
Director.

[Enclosure.]

QUESTIONS FROM SENATOR DORGAN

Question 1. I understand that the NRC is now refocusing its efforts on force-on-force security exercises at nuclear power facilities. Under this program, the NRC is now allowing third party security forces to perform these training exercises. What are the reasons for this change in practice?

Answer. Since the inception of the force-on-force (FOF) security exercise program in the early 1980's, there has been essentially no change in the practice of using security officers from the facility being evaluated, other nuclear power facilities, or local law enforcement officers to serve as mock attackers during FOF exercises. During pilot program FOF exercises aimed at strengthening the program in 2003, the NRC identified a need to improve the offensive abilities, consistency, and effectiveness of the exercise adversary force. The Commission addressed this need by directing the staff to develop a training standard for a Composite Adversary Force (CAF) which will travel from site to site to serve as the mock adversary. The CAF for a given NRC-evaluated FOF exercise will include security officers from various nuclear power facilities (excluding the licensee being evaluated) and will have been trained in offensive, rather than defensive, skills to perform the adversary function. We believe this will lead to a more effective exercise.

Question 2. Do you agree that by allowing third party contractors to essentially evaluate their own readiness, there may be a perception that these evaluations pose a conflict of interest?

Answer. CAF members do not perform an evaluative function. The NRC and its subject matter expert (SME) contractors evaluate the performance of each licensee during FOF exercises, and the NRC will continue to evaluate the abilities, consistency, and effectiveness of the exercise adversary force.

The industry has selected Wackenhut to manage the CAF. Wackenhut also provides protective services to a substantial number of operating power reactors. The NRC recognizes that some may perceive a conflict of interest with respect to the same contractor providing both the protective services to some individual sites and staffing some members of the adversary force used for exercises. The Commission has directed the staff to ensure that there is a clear separation of functions, including appropriate management and administrative controls, in place within the

Wackenhut organization to provide adequate independence between the Composite Adversary Force and the nuclear reactor guard force. In addition, the NRC will continue to assess the performance of the adversary force and require improvements if appropriate, including developing an NRC-contracted adversary force. One of the benefits of an industry adversary force is the feedback of a mock adversary's perspective into enhancement of site protective strategies and security officer training at his or her normally assigned facility, as well as improving the quality of FOF exercises conducted by the licensees annually for training.

Question 3. I do not feel security forces, especially in the area of nuclear security, should be allowed to evaluate themselves. If this is happening, what procedures have the NRC put in place to ensure that members of the same company evaluating their own security teams will be isolated from each other?

Answer. The evaluation is done by the NRC. The NRC independently evaluates licensee performance in FOF exercises at each site on at least a triennial basis, using the CAF to provide a consistent, capable, and effective adversary. The CAF will not perform an evaluative role in the exercises. CAF members will arrive on site at about the same time that the NRC evaluation team arrives and will be coordinating closely with the NRC evaluation team and the NBC's SME contractors before and during the exercises.

In addition, each facility licensee will conduct its own FOF training exercises each year during the remaining 2 years of the triennial evaluation cycle. The industry has included provisions for conducting FOF training exercises in the training and qualification section of each site's unique security plan. The NRC is currently reviewing and approving these security plans. The NRC includes verification of the proper conduct of industry-conducted FOF exercises in its procedures for periodic inspections of the licensee's security training programs. The NRC will also maintain its capabilities to conduct independent verification of licensee performance, on a for-cause basis, as needed.

Question 4. It would seem that the best way to avoid a potential conflict of interest would be to have the government conduct these exercises like they did before 2001. What level of funding or other tools are needed for the NRC to be able to conduct force-on-force exercises like they did before September 11, 2001?

Answer. Prior to September 11, 2001, the exercise adversary force was also provided by the licensee being evaluated, usually from another site's security force. Then, as now, the NRC was the sole evaluator of licensees' performance during the exercises. The NRC expects the CAF to be a significant improvement in ability, consistency, and effectiveness over the status quo before September 11, 2001.

Since September 11, 2001, the NRC has made additional enhancements to the FOF exercise program, including an increase in the frequency of NRC-evaluated FOF exercises from once every 8 years to once every 3 years, the use of the Multiple Integrated Laser Engagement System (MILES) equipment for effective and objective evaluations, and a significant reduction in the licensee's notification time associated with exercise logistics and the use of Trusted Agent Agreements to minimize opportunities for compromising exercise integrity. The NRC believes that these changes, taken together in an integrated program, have substantially improved the effectiveness and quality of the FOF program.

The NRC routinely reassesses the effectiveness and efficiency of its FOF evaluation program and has mechanisms in place to revise or improve its FOF processes and procedures as needed. Should industry be unable to maintain an adequate and objective CAF that meets the standards mandated by the NRC, the NRC has a contingency plan that would expand its support agreement with DOE/NNSA to fulfill the CAF function. The cost of this contingency is estimated at $4.3 million annually.

DEPARTMENT OF ENERGY,
CONGRESSIONAL AND INTERGOVERNMENTAL AFFAIRS,
Washington, DC, September 29, 2004.

Hon. PETE V. DOMENICI,
Chairman, Committee on Energy and Natural Resources, U.S. Senate, Washington, DC.

DEAR MR. CHAIRMAN: On July 13, 2004, Kyle E. McSlarrow, Deputy Secretary, testified regarding the role of nuclear power in national energy policy.

Enclosed are the answers to 20 questions that were submitted by Senators Craig, Alexander, Landrieu, and you for the hearing record. The four remaining answers are being prepared and will be forwarded to you as soon as possible.

If we can be of further assistance, please have your staff contact our Congressional Hearing Coordinator, Lillian Owen, at (202) 586-2031.

Sincerely,

RICK A. DEARBORN,
Assistant Secretary.

[Enclosures.]

QUESTIONS FROM SENATOR DOMENICI

Question 1. Earlier this year three consortia responded to a solicitation from DOE asking energy companies for proposals to test the NRC's new licensing process. That's an absolutely critical step toward new plant construction and one that we should strongly encourage. But to date, the Administration has only provided nominal financial support to one consortium. What's the status of support for the other two consortia?

Answer. The Department has completed the technical merit and programmatic review of the New Nuclear Plant Licensing Demonstration Project proposals from teams led by NuStart Energy, LLC and Dominion Resources. Several important issues were identified during these reviews and, during the week of July 26, 2004, the Department met with representatives of both teams to obtain clarifications. One team, NuStart Energy, also provided a revised proposal. The Department is evaluating the new information obtained from each team.

Question 2. How soon will the Administration provide significant encouragement to these other consortia to get them moving too?

Answer. The Department is evaluating new information provided by the NuStart LLC and Dominion Energy, Inc. teams. As soon as this process is complete, we will be in a position to make a final decision.

Question 3. In developing the comprehensive energy bill, I believed that the first priority for nuclear power was to see a few new plants built in this country. That required extension of Price Anderson and some government assistance to reduce the financial risks of new plant construction. Any construction in the near future would involve advanced models of our current reactors.

Just below those top priorities, I supported construction of a Generation IV reactor, study of advanced fuel cycles, and improved university programs. But no Gen IV reactor is going to be ready for commercial use for a long time, at least 20 years. We can't wait that long to start our nuclear renaissance.

Yet some argue that we should just push immediately for the advanced reactors and forget about building the advanced models of current reactors.

What's your view on this key issue? Do you think it is realistic build Generation IV reactors and use advanced fuel cycles without new starts of advanced plants of our current generation?

Answer. The Department believes that for nuclear energy to make a real contribution in the near and the long term, both new orders for advanced light water reactors, and Generation IV systems are needed. Without new orders for current-technology advanced light water reactors, the country will lose vital intellectual, technical, and industrial infrastructure that will be extremely difficult and expensive to reestablish. On the other hand, without advanced Generation IV reactors and fuel cycles, nuclear energy will not become truly sustainable in the long term. In the even longer time-frame, Generation IV fast reactors will manage the burden of ever-increasing quantities of spent nuclear fuel and, eventually, provide the needed fuel when uranium becomes scarce.

Question 4. What plans does DOE have to work with the industry to develop and commission a Generation IV reactor in a manner that will effect an easy transition to a commercial Generation IV design? How would such a project be financed, if the industry is committed in the near term to Generation III licensing and construction?

Answer. The Department has not made a decision on whether to proceed with Generation IV reactor; however, on May 26, 2004, the Department published a Request for Information and Expressions of Interest in its conceptual strategy for developing and demonstrating a Generation IV reactor capable of both hydrogen production and electricity generation. In our conceptual strategy, the Department proposes to partner with private industry in the form of a "Project Integrator" to lead the development of the NGNP. The Project Integrator would hold a design competition to select the most commercially promising NGNP technology capable of meeting the Department's goals and then would organize an international consortium that would on a cost shared basis with the Department, design, develop, construct and operate the NGNP.

The Department would anticipate a 50-50 cost share over the life of the project. We believe that this cost share expectation is realistic given the huge market poten-

tial of a successful NGNP. We expect electric utilities will continue to focus on near-term, Generation III+ technology for the foreseeable future. However, we anticipate considerable interest in the NGNP effort from both domestic and international vendors.

Question 5. For over half a century the U.S. has provided responsible technical nuclear leadership in commercial nuclear technology. Foreign nations have taken U.S. technology and developed their own programs for the benefit of their own countries.

How does DOE intend to regain U.S. technical leadership in commercial nuclear technology other than participation in both the Generation IV International Forum and the Paris-based OECD Steering Committee on Nuclear Energy? Do you agree such leadership is important?

Answer. U.S. leadership in commercial nuclear technology is very important and the fact that the U.S. chairs both the Generation IV International Forum and the OECD Steering Committee on Nuclear Energy clearly represents that revived leadership. Such leadership enables the United States to influence international nonproliferation institutions, and monitoring and inspection arrangements, as well as the deployment of nuclear energy around the world. United States leadership will be enhanced by deploying new nuclear energy capacity and commissioning a geologic repository. Additionally, this will strengthen our position in the international market and in the development of Generation IV nuclear systems in cooperation with other countries.

Question 6. The DOE estimates that by 2020, 15% of our natural gas will have to be imported from non-North American sources, even with completion of the Alaskan pipeline.

Each new large nuclear plant will displace about 112 billion cubic feet of natural gas per year. Ten large new nuclear plants could substitute for 5 percent of the nation's total natural gas needs—that would be an immense cut in our need for LNG imports. And with gas at $5 per thousand cubic feet, just that 5 percent translates to about $6 billion that we wouldn't be sending overseas to pay for imports.

With gas prices where they are now and are likely to be, isn't it sound national economic policy to increase our use of nuclear power?

Answer. As reflected in the National Energy Policy, we believe that increased use of nuclear energy should be a major component of our national energy policy. This is supported by the economic advantages that accrue as the price of alternate fuels increases, the excellent safety record, the security of energy supply, the small footprint and light environmental burden of nuclear systems, the absence of greenhouse gas emissions, and the positive influence on the U.S. trade balance.

Question 7. Over the next 20 years, what role do you see for nuclear power in reducing our dependency on foreign energy suppliers?

Answer. I see increased deployment of new nuclear power plants to reduce U.S. dependency on foreign energy suppliers. New advanced light water reactors, currently being developed in cooperation with industry, will, when deployed, reduce the importation of natural and liquefied gas for electrical generation. Further, in the longer term, the development of the Next Generation Nuclear Plant, coupled to advanced electricity and hydrogen generation capabilities, and its commercial follow-on plants will not only offset gas imports, but produce hydrogen for our transportation infrastructure that will offset the use and therefore the importation of oil from foreign sources.

Question 8. I am a strong supporter of the new reactor at Idaho. I worked to insert $15 million into the budget for this year to start the competition for that new reactor. I was pleased that the Secretary assured Senator Craig and me in January that competition for the new reactor would begin this fiscal year.

I'm pretty disappointed that it took 8 months of the fiscal year to even issue a 4 page Expression of Interest for the new reactor. Several areas in those four pages are of concern to me, including the suggestion that an operational 2020 date is acceptable. That's just far too long. Furthermore, it's hard to see how any effective design competition is going to start this year after so much delay.

Does the Administration support construction of the new Idaho Reactor?

Answer. We are very excited by the possibilities presented by the NGNP. Because the INL is our preferred location for such a project, it was essential that we complete our Request for Proposals for the management and operating contract for that lab before issuing our Expression of Interest (EOI) document. While only a few pages long, the EOI lays out a new and exciting approach to the NGNP that has generated great interest. We have held detailed discussions with 12 large U.S. companies that are interested in serving as the project integrator for the NGNP. The input we have received and the interest we have seen in this initiative will be weighed as we make a final decision regarding this project.

Question 9. Do you concur that it is critical to get this reactor operating quickly enough to help the nation's nuclear program recover some of its design leadership? And do you believe that a 2020 reactor start-up date accomplishes that goal?

Answer. The Department believes that the Next Generation Nuclear Plant is a critical component of our overall strategy to reinvigorate the domestic nuclear industry and ensure a domestic energy supply free from dependence on foreign energy providers. We feel that the NGNP works in concert with the NP 2010 program to strengthen our national nuclear infrastructure and enhance U.S. leadership in the international nuclear arena.

A specific timetable for development of the NGNP depends upon a number of factors and remains to be determined. We believe, however, our strategy of involving the private sector could result in a plan that meets our technology goals at an earlier date.

QUESTIONS FROM SENATOR CRAIG

NEXT GENERATION NUCLEAR PLANT

Question 1. DOE specifies that the project integrator must be a "U.S. owned" organization. This will narrow the field of nuclear experienced competitors considerably.

Energy in general, and nuclear specifically, is an increasingly global business. Countries like France and Japan have been investing in nuclear energy research during all the years that we were not. They have built reactors—recently. We will need other countries in order to make this demonstration a success.

DOE wants to build the NGNP as part of an international consortium—and DOE is also requiring these other countries to cost share in the reactor—probably substantially. In addition, these international participants will be exposing their intellectual property to the larger consortium.

Why did DOE require a "U.S. owned" entity, instead of a "company incorporated in the U.S."?

Answer. The request for expressions of interest puts forth a proposal and does not reflect a final decision on this issue; however, the Department believes that with the large amount of government funding expected for this project, paid for by the U.S. taxpayer, it is appropriate to consider requiring that a U.S. owned company serve as the integrator for the development of the Next Generation Nuclear Plant. This would not "narrow the field" of nuclear-experienced companies that can contribute to the project. Our strategy, in fact, relies significantly on the participation of international organizations on the NGNP consortium that would ultimately develop, design, and build a pilot facility.

Question 2. Why should international participants be willing to put their intellectual property into this project—when the "U.S. owned" integrator will, at the end of the demonstration, "lead the commercial deployment of the design"?

Answer. The primary role of the integrator is to identify a private-sector-led consortium to carry forward this technology. It will be the consortium that will "lead the commercial deployment of the design," not the integrator. The technology rights of each member of the consortium would be negotiated on an open, commercial basis.

Question 3. DOE has specified an outlet temperature of 1000 degrees C for its "base concept" for NGNP. Some believe this will not be possible with currently used and qualified materials.

Do you agree that although the NGNP must stretch the envelope in technology development, this goal must be tempered with the need to develop the foundation for deploying a reactor that is economically competitive and that harbors a minimum of inherent economic risks, if any?

Answer. Yes, the Department agrees that the overriding concern in the development of the NGNP is that it be commercially attractive. To that end, as reflected in the EOI, the Department is not imposing design specifications for outlet temperature of the NGNP. Rather, the Department intends to specify economic performance goals that will ensure that the NGNP will generate electricity and hydrogen economically and therefore will find receptive customers and contribute in a meaningful way to our national energy economy.

Question 4. DOE will pursue NRC licensing for the NGNP—which I believe is absolutely critical to the success of the project.

Since the project will be externally regulated by NRC, is DOE limiting the redundant involvement of DOE's own safety and health office and of the Defense Nuclear Facilities Safety Board? If not, will DOE have achieved a demonstration whose results can be translated to the commercial sector?

Answer. The Department believes that redundant or overlapping oversight leads to confusion and conflict, and must be avoided. In the case of the Next Generation Nuclear Plant, Nuclear Regulatory Commission (NRC) oversight is a key element to make the selected technology commercially deployable. While no final decision regarding the licensing and safety oversight of the NGNP has been made, it is our view that this project should be overseen by the NRC as would any other commercial nuclear power project. That said, with the demonstration of this technology at the preferred site of the Idaho National Laboratory, an interface between NRC and the Department's oversight organizations would be required, but must be clear and constructive to maintain safety and protect the environment while achieving our objectives. Because the NGNP is a civilian technology at a non-defense site, we do not envision a role for the Defense Nuclear Facilities Safety Board.

Question 5. How is DOE providing resources to the NRC to be involved with the demonstration at its earliest stages?

Answer. Over the past year, the Department and NRC senior management have met several times to discuss various strategies for licensing the NGNP. The Department continues to work with the NRC on various technology components that may be incorporated into the NGNP. Some examples include the Advanced Gas Reactor fuel development program that has been coordinated with the NRC to ensure that NRC gets the data it needs to make its own evaluation as to the behavior of this fuel under accident conditions. The Department is also preparing to jointly fund, with the NRC, low-flux vessel-steel irradiation studies so that both development and regulatory data needs are met. Further, we are funding studies at the Idaho National Engineering and Environmental Laboratory that will assist the NRC in developing a risk-informed, technology-neutral licensing framework for advanced reactors and in evaluating the license-by-test concept.

PRICE ANDERSON REAUTHORIZATION

Question 6. The provisions of the Price-Anderson Act that provide insurance for commercial nuclear power plants licensed by NRC expired last year. While existing NRC licensed facilities are grandfathered, any new nuclear reactors would not have Price-Anderson coverage until the law is reauthorized. I understand from utility executives that no one is prepared to invest in new commercial nuclear power until they are assured that Price-Anderson insurance will be available to protect the public.

Does the Administration still support the expeditious reauthorization of the expired portions of Price-Anderson dealing with commercial reactors so that there can be new nuclear development in this country?

Answer. The Administration strongly supports the expeditious reauthorization of the Price-Anderson Act (the Act). Although all current reactors would continue to receive coverage without reauthorization of the Act, industry would not be in a position to consider the construction of new nuclear power plants.

The indemnification provisions under the Act provide both the economic protections needed to allow for the construction of new nuclear plants in the United States and protects the interests of property owners in the improbable event of a nuclear power plant accident. The Act establishes the ideal design for an insurance program where the probability for occurrence of an event is extremely remote, but the potential damages could be very high. The retrospective premium aspects under the Act minimize the cost of this indemnification to electric ratepayers, but still provide over $10 billion in coverage. Further, claimants benefit from the fact that industry would assume full responsibility for a nuclear accident rather than engaging in lengthy legal processes.

QUESTIONS FROM SENATOR ALEXANDER

Question 1a. In January 2001, Secretary Richardson issued a record of decision regarding the production and processing of Plutonium-238. In this decision, the Department acknowledged that the Radiological Engineering Development Center (REDC) at Oak Ridge National Laboratory was the preferred facility for processing irradiated targets. The REDO facility has over 30 years of target fabrication and processing experience. However, despite this proven record and the Department's recent decision, the Department has proposed consolidating the plutonium-238 program at the Idaho National Laboratory.

Why would the Department reverse this decision through a contract proposal for the operation of Idaho National Laboratory?

Answer. The Department is revisiting its decision on where the production of plutonium-238 should be reestablished since the original decision was made prior to the events of September 11, 2001. Because plutonium-238 requires significant pre-

cautions to protect this material, there are significant security benefits that could be achieved by consolidating all plutonium-238 operations at a single, well-protected site that is remote from the public. The Department is, therefore, exploring this option. Reestablishing the production of plutonium-238 operations that would be included in consolidation of these operations. As a result, the Department asked that bidders interested in operating the new Idaho National Laboratory address, as part of their proposals, the potential consolidation of all plutonium-238 operations at this laboratory. Such consolidation would include the plutonium-238 processing and encapsulation efforts currently being done at Los Alamos National Laboratory as well as the plutonium-238 production efforts previously proposed to be established at Oak Ridge National Laboratory but not yet established. Consolidation would eliminate the need to ship irradiated targets and plutonium-238 between the various sites, thereby enhancing overall security, and would increase program efficiency and flexibility by doing all of the operations at a single site. With the required target irradiation planned to occur primarily at the Advanced Test Reactor in Idaho and with the assembly and testing of heat sources and generators already being moved to Idaho from the Mound Site in Ohio, the logical site for potential consolidation is the Idaho National Laboratory. It is in this context that the Request for Proposals included the potential consolidation of all plutonium-238 operations as an option to be considered in the contractor proposals. Since the previous decision on the facilities to be used for reestablishing plutonium-238 production was issued in the January 2001 Record of Decision, any change in this decision would be only be made after completing an appropriate environmental review and decision process.

Question 1b. Is the Department going to conduct a full National Environmental Policy Act (NEPA) review of the proposed operations at the Idaho National Laboratory for processing and—encapsulating plutonium-238? If so, when will this review be conducted and when will public comment be accepted on the proposed plutonium-238 activities?

Answer. Yes, the Department will conduct a full National Environmental Policy Act review for the proposed Plutonium-238 Consolidation Project before a final decision is made to pursue the project. The review, in the form of an environmental impact statement, will be initiated in the near future and is expected to last between 12 and 18 months. There will be several opportunities for the public to comment on the proposed action during the preparation of the environmental impact statement. The specific dates for the public comment period have not yet been established, but will be made public as soon as possible.

Question 1c. Does the Idaho National Laboratory have sufficient expertise and facilities to process irradiated targets in the most timely and economical manner?

Answer. The irradiation and processing of irradiated targets has been accomplished at the Idaho National Laboratory site for many years. Key programs involved in this effort include the past operation of the Idaho Chemical Processing Plant, one of DOE's three former large-scale reprocessing facilities; the ongoing operation of the Fuel Conditioning Facility and other experimental work in support of the Advanced Fuel Cycle Initiative; isotope production and separation at the Test Reactor Area; and numerous experiments at several analytical laboratories across the site. Therefore, adequate technical expertise exists at the site. Equipment and facilities needed to process the irradiated targets would have to be procured and constructed, but this type of activity would be required to place this mission. at any potential site, including the Oak Ridge National Laboratory. In addition, consolidation of all plutonium-238 activities at Idaho National Laboratory would significantly increase programmatic reliability and reduce operational costs—in part by eliminating the need to transport radioactive materials across the country.

Question 1d. How many staff currently work at the Idaho National Laboratory that have expertise in processing irradiated materials?

Answer. There are several hundred staff members at the Idaho site that have relevant experience with the irradiation and processing of irradiated target materials. This experience has been gained through programs such as the past operation of the Idaho Chemical Processing Plant, the ongoing operation of the Fuel Conditioning Facility and the production and separation of isotopes for the isotope production program.

Question 1e. Has the Department done a detailed analysis of the cost of consolidating this program at Idaho including construction of new facilities and additional security requirements for such facilities? If so, what are the detailed costs including the cost of constructing a new category I nuclear facility for processing the plutonium-238 oxide and the cost of constructing the hot cells for processing the irradiated targets?

Answer. The Department has completed a preliminary cost estimate for the proposed plutonium-238 Consolidation Project. This project would be conducted in an

already secure area and, therefore, should not involve any significant increase in security costs. The cost estimate for the proposed Plutonium-238 Consolidation Project includes the construction of a hazard category 2 nuclear facility. This facility would support both the production of new plutonium-238 and the processing and encapsulation of the plutonium-238 that is currently accomplished at Los Alamos National Laboratory. The cost estimate for the facility to include both of these functions is $205 million to $230 million over five years. The cost estimate for installing the target processing mission at INL is about the same as the cost for installing the mission at ORNL, but operating costs are projected to be lower if the consolidation of plutonium-238 activities in Idaho is completed.

Question 1f. Does the Department have a detailed plan for consolidating this program at Idaho National Laboratory that include facility designs and project milestones? If so, please elaborate upon these plans.

Answer. No, the Department does not have a detailed plan for the potential consolidation of the plutonium-238 operations at the Idaho National Laboratory. The project is not yet approved by the Department and project specific funding is not included in the fiscal year 2005 budget request before Congress. The Department has developed preliminary high-level milestones and plans for the project. However, the Department plans to complete a National Environmental Policy Act review and initiating conceptual facility designs over the next 12-18 months. Final facility designs and firm project level milestones would be established after the National Environmental Policy Act review is completed and a Record of Decision issued.

Question 1g. Does the Department have a cost estimate for shutting down these operations at Oak Ridge National Laboratory?

Answer. The capability to produce plutonium-238 does not currently exist and, therefore, there would be no cost associated with shutting down these operations. A small amount of funding, on the order of $1 million per year, has been directed towards the planning for plutonium-238 production and no major investments have been made in facilities or hardware. If the Department should decide to pursue the Plutonium-238 Consolidation Project, it would not affect other ongoing operations at the Oak Ridge National Laboratory. Therefore, the impact on the Oak Ridge National Laboratory is expected to be negligible.

Question 1h. Has the Department performed an environmental impact analysis of consolidating this program at Idaho?

Answer. No, the Department has not yet performed an environmental impact analysis for consolidating the plutonium-238 operations in Idaho. However, in support of the Plutonium-238 Consolidation Project, the Department plans to initiate a National Environmental Policy Act review during FY 2005.

Question 2. Is the budget for the Office of Nuclear Energy, Science, and Technology sufficient to research, design, develop, and deploy a next generation nuclear reactor? Please elaborate upon your response.

Answer. The budget requests for the NGNP to date have been submitted as part of the overall Generation IV Nuclear Energy Systems Initiative. Thus far, these budget requests have been consistent with the early planning stages for the NGNP program. The Department places a very high priority on the Next Generation Nuclear Plant program. If a decision is made to proceed with development of the NGNP, as the program moves forward into design and build phases, the Department would reflect the need for additional funding in its future budget requests.

Question 3. What cost arrangements does the Department foresee with its industrial partners in the design, construction, and deployment of the next generation nuclear plant?

Answer. The Department anticipates a 50-50 cost share arrangement over the life of the NGNP program, with the Department assuming more of the burden, in the first few years to establish the baseline technology and supporting research and development and our partners in the program doing so in the later stages of the program.

Question 4. Is the Department's budget sufficient to support the activities of the three consortia that have responded to the Department's solicitation for participation in the Nuclear Power 2010 program?

Answer. The Department's FY 2005 request was formulated before we received proposals from the three consortia. As a result, we did not have the information required to estimate the cost of these projects. Further, it was unclear, until we received these proposals in the spring of this year, that industry was interested in proceeding with projects to demonstrate the licensing process for new nuclear power plants. The information we have now received will be taken into account as we develop our funding requirements for FY 2006 and beyond.

QUESTIONS FROM SENATOR LANDRIEU

Question 3. Given the importance of the Nuclear Power 2010 program in terms of testing the combined construction and operation process is DOE going to increase its funding level from $10 million back to recommended level of $20 million?

Answer. The Department's FY 2005 request was formulated before we received proposals from the three consortia. As a result, we did not have the information required to estimate the cost of these projects. Further, it was unclear, until we received these proposals in the spring of this year, that industry was interested in proceeding with projects to demonstrate the licensing process for new nuclear power plants. The information we have now received will be taken into account as we develop our funding requirements for FY 2006 and beyond.

DEPARTMENT OF ENERGY,
CONGRESSIONAL AND INTERGOVERNMENTAL AFFAIRS,
Washington, DC, October 4, 2004.

Hon. PETE V. DOMENICI,
Chairman, Committee on Energy and Natural Resources, U.S. Senate, Washington, DC.

DEAR MR. CHAIRMAN: On July 13, 2004, Kyle E. McSlarrow, Deputy Secretary, testified regarding the role of nuclear power in national energy policy. On September 29, 2004, we sent you the answers to 20 questions for this hearing.

Enclosed are answers to the four remaining questions that were submitted by Senators Landrieu and Feinstein to complete the hearing record.

If we can be of further assistance, please have your staff contact our Congressional Hearing Coordinator, Lillian Owen, at (202) 586-2031.

Sincerely,

RICK A. DEARBORN,
Assistant Secretary.

[Enclosures.]

QUESTIONS FROM SENATOR LANDRIEU

FUNDING

Question 1. Has the Department begun to re-prioritize its internal programmatic funding to account for the $749 million shortfall for Yucca Mountain in Fiscal-Year 2005?

Answer. The Office of Civilian Radioactive Waste Management is currently reviewing its budget request for FY 05 in light of the amount that would be appropriated in the House passed Energy and Water Development Appropriations bill. That said, it is vital that the program receive its budget request, and that the Congress enact the legislation to reclassify fees paid into the Nuclear Waste Fund as offsetting collections.

CONTINGENCY PLANS

Question 2. DOE must have been aware from the direction of the oral arguments made in the United States Court of Appeals for the District of Columbia that the current EPA standard for 10,000 years could be thrown out—What contingency plans has DOE made in terms of moving forward with Yucca Mountain?

Answer. I do not believe that the 10,000 year standard was thrown out. As I stated at the hearing, I believe the issue is what you do after the 10,000 year period. We still intend to submit an appropriate license application with the Nuclear Regulatory Commission in light of the court decision. If the safety standard is revised at some point, we will address this issue.

QUESTIONS FROM SENATOR FEINSTEIN

FUNDING CONTINUATION

Question 1. On Friday, a federal appeals court ruled that that the EPA must take into account findings by the National Academy of Sciences, which called for a storage system that would protect against radiation releases beyond the next 10,000 years.

A former DOE official, Lake H. Barrett, wrote in 1999 that devising a radiation standard beyond the next 10,000 years "would be unprecedented, unworkable, and probably unimplementable."

Should we continue to spend billions of dollars to develop the single repository when we could harden the existing storage sites?

Answer. The national policy since 1982 has been to pursue geologic disposal. This policy, which was made law in the Nuclear Waste Policy Act, was recommended by the National.Academy of Sciences, has been consistently endorsed over the years by four presidents and the Congress, and is overwhelmingly the choice of the international community.

BUDGET SHORTFALL

Question 2. The President's Budget included $880 million for the DOE civilian nuclear waste disposal program, a 50% boost over FY2004. The Administration also is proposing that $749 million of the FY2005 request be offset by the existing nuclear waste fee, so that the net appropriation would be $131 million. The House Appropriations Committee, noting that Congress has not enacted the Administration's waste-fee offset proposal, voted to provide only the $131 million net appropriation request.

Without at least $600 million (according to lobbyists for the nuclear power industry), Yucca cannot continue-the House Energy and Water Appropriations Committee report noted DOE'S prediction that the funding reduction could force layoffs of 70% of the program's work force, place submittal of the repository license application "at risk," and cause "an indefinite delay in opening the repository."

How is the Administration going to try to make up the budgetary shortfall?

Answer. We are currently working with the leadership in the Senate and the House, as well as the Office of Management and Budget, to secure adequate funding for the program.

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