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OVERSIGHT ON THE REGULATORY PROCESSES FOR NEW AND EXISTING NUCLEAR PLANTS

HEARING

BEFORE THE

SUBCOMMITTEE ON CLEAN AIR, CLIMATE CHANGE, AND NUCLEAR SAFETY

OF THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

JUNE 22, 2006

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OVERSIGHT ON THE REGULATORY PROCESSES FOR NEW AND EXISTING NUCLEAR PLANTS

THURSDAY, JUNE 22, 2006

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON CLEAN AIR, CLIMATE CHANGE
AND NUCLEAR SAFETY,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:30 a.m. in room 628, Dirksen Senate Office Building, Hon. George Voinovich (chairman of the subcommittee) presiding.

Present: Senators Voinovich, Inhofe, Isakson, Carper, Jeffords, Clinton, and Lautenberg.

Senator VOINOVICH. The hearing will come to order.

OPENING STATEMENT OF HON. GEORGE V. VOINOVICH, U.S. SENATOR FROM THE STATE OF OHIO

Good morning, and thank you for coming. Today's hearing continues the committee's strong oversight of the Nuclear Regulatory Commission. It is the second NRC oversight hearing this year, the sixth that I have chaired, and the ninth in the series that began in 1998 when Senator Inhofe was chairman of the subcommittee. These hearings have had a dual effect of improved performance by the Commission and allowing all of us to get to know the esteemed chairman, Nils Diaz.

Chairman Diaz, we have met and spoken frequently over the past few years, and it has been a great pleasure to work with you. You have been very conscientious in following through in all of the things that we have talked about.

This is the last time that you will be before us, after serving on the Commission selflessly since 1996, including the last 3 years as the Chairman. I sincerely appreciate your years of dedication and hard work and wish you well in your retirement. I want also to thank your family for the sacrifice that they have made so that you could do the job that you have done at the Commission. Your vision and leadership have had a profound impact, and, as a result, I believe the NRC is better prepared to face the many challenges that lie ahead.

You are leaving at an exciting time, because we are starting a whole new stage that we have not been confronted with, a new challenge, as you know, with all of the new applications we hope are going to be coming in.

While a change in leadership at this time could be problematic, we have taken steps in this committee and the Senate to ensure a smooth transition. Too often we leave positions vacant for a while, but in this case the importance of this matter led us to confirm Dr. Dale Kline to be the next NRC chairman more than a month early.

Chairman Diaz, you are leaving the NRC in good hands, as I believe you have somebody I think that has the mix of technical policy and management experience that is necessary. I am sure that you are going to spend as much time as you can with him to try to make sure that you answer his questions and help him along the way. We appreciate that.

We also acted to confirm Commissioners Jaczko and Lyons, who had been appointed, so we took care of all three, so we are ready to roll. I am very pleased that each of you could be here today and we have a fully confirmed Commission at this time.

On the second panel, we have Mr. Barnie Beasley of Southern Nuclear Company, Dr. David Lochbaum of the Union of Concerned Scientists, and Kevin Book, an energy analyst at the investment banking firm of Friedman Billings Ramsey. I welcome them and appreciate their being here today.

As many of you know, I am a strong proponent of nuclear power. It provides about 6 percent of the electricity consumed in my State and about 20 percent nationally. It is emission-free power, and by increasing its use, we can help meet our energy needs, be less reliant on natural gas, and improve the quality of our air.

Last year on this committee, we spent a considerable amount of time on the legislation providing for the safe and secure grown of nuclear power. Our provisions and several other key initiatives were included in the Energy bill, leading the NRC to project that we will receive applications for 17 or more new plants during the next 2 to 3 years.

This is a huge challenge, as I mentioned, for an Agency that has not seen this type of major licensing actions in the last 25 years. More than ever, NRC must provide regulatory stability in both its reactor oversight and new reactor licensing processes. Ensuring the safety and security of our existing nuclear powerplants is absolutely essential if we are to continue and hopefully increase our Nation's use of nuclear energy.

At the same time, NRC must move forward in a timely fashion with updating its regulatory and organizational infrastructures to make the licensing process for new reactors more efficient. That is why we are specifically focusing this morning on the regulatory processes for new and existing plants. The Commission must take a balanced approach as a regulator that ensures the safe operation of the existing fleet of nuclear powerplants without stifling the growth of nuclear power.

I look forward to hearing from the witnesses their thoughts on the NRC's oversight of the existing fleet of plants and the infrastructure that is being established to accommodate the expected applications for new ones.

[The prepared statement of Senator Voinovich follows:]

STATEMENT OF HON. GEORGE V. VOINOVICH, U.S. SENATOR FROM THE STATE OF OHIO

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These hearings have had a dual effect of improved performance by the Commission and allowing all of us to get to know the esteemed Chairman Nils Diaz. Chairman Diaz, we have met and spoken frequently over the past few years, and it has been a great pleasure to work with you.

This is the last time that you will be before us after serving on the Commission selflessly since 1996, including the last 3 years as chairman. I sincerely appreciate your years of dedication and hard work and wish you well in your retirement. Your vision and leadership have had a profound impact, and as a result, I believe the NRC is better prepared to face the many challenges that lie ahead.

While a change in leadership at this time could be problematic, we have taken steps in this committee and the Senate to ensure a smooth transition. Too often, we leave positions vacant for awhile—but in this case, the importance of this matter led us to confirm Dr. Dale Klein to be the next NRC chairman more than a month early. Chairman Diaz, you are leaving the NRC in good hands as I believe he has the right mix of technical, policy, and management experience.

We also acted to confirm Commissioners Jaczko and Lyons who had been recess appointed. I am very pleased that each of you could be here today and that we have a fully confirmed Commission at this critical time. On the second panel, we have Mr. Barnie Beasley of Southern Nuclear Company, Mr. David Lochbaum of the Union of Concerned Scientists, and Mr. Kevin Book, an energy analyst at the investment banking firm of Friedman Billings Ramsey. Welcome and I appreciate you all being here today.

I am a strong proponent of nuclear power. It provides about six percent of the electricity consumed in my state and about 20 percent nationally. It is emission free power, and by increasing its use, we can help meet our energy needs, be less reliant on natural gas, and improve the quality of our air.

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Thank you.

Senator VOINOVICH. Senator Carper, do you have a statement that you'd like to make?

Senator CARPER. Let's let Senator Jeffords go next.

Senator VOINOVICH. Senator Jeffords.

Senator JEFFORDS. Thank you, Mr. Chairman.

OPENING STATEMENT OF HON. JAMES M. JEFFORDS, U.S. SENATOR FROM THE STATE OF VERMONT

In today's hearing this subcommittee will conduct needed oversight. We will examine the NRC's efforts to regulate and ensure the safety of existing and proposed nuclear reactors.

Chairman Voinovich, this is a timely and important topic. You and Ranking Member Carper deserve credit for continuing to hold regular oversight hearings on nuclear issues during this session of Congress.

We should be focused on the safe operation of existing plants. As I have said in our last hearing, the Commission and the nuclear industry are planning a nuclear renaissance with the construction of new nuclear plants, but we must maintain continued oversight over existing plants.

Just this month the NRC increased its estimate of the number of new license requests that the Agency will receive between now and the year 2012. In just the past 2 weeks, that estimate has gone from 13 plants to 17 plants. Even if the NRC is able to meet such an aggressive schedule for new plants, this country is dependent upon existing aging nuclear plants. We should not cut back on our efforts to ensure that existing plants operate well and safely.

We are boosting the power output of existing plants in extending the terms of their licenses. The public needs to be confident that the current fleet operates well, or they will be unlikely to accept a new generation of plants.

Over the last few years, we have had several issues at operating plants. Some have been significant safety issues, others, though not so significant from a safety perspective, have eroded public confidence in the NRC. One such instance was the loss of spent fuel rods at Vermont Yankee in 2004. As a result of this and other incidents of lost spent nuclear fuel, I asked the GAO to study how the NRC controls this intensely radioactive material. In its April 2005 report, the GAO recommended the NRC establish requirements for the control of loose fuel rods and develop inspection procedures to verify plants' compliance.

In a letter sent to me more than a year ago, the NRC stated it had several actions ongoing to address the shortcomings identified by the GAO, but I am disappointed to learn recently the NRC has made little progress in actually implementing these recommendations. I would welcome additional information about the NRC plans to address this important issue.

The NRC needs to redouble its efforts to work with the public and to shore up public confidence in its regulatory efforts. This is a difficult task, but one that is critically important.

I thank the witnesses for coming here today to discuss these issues, along with other members of the committee, and I acknowledge and thank Chairman Diaz for his 10 years of service with the NRC. I know you will be as successful in your future endeavors, and I wish you well.

Thank you, Mr. Chairman.

[The prepared statement of Senator Jeffords follows:]

STATEMENT OF HON. JAMES M. JEFFORDS, U.S. SENATOR FROM THE STATE OF VERMONT

Thank you, Mr. Chairman. In today's hearing, the subcommittee will conduct needed oversight. We will examine the NRC's efforts to regulate and ensure the safety of existing and proposed new nuclear reactors. Chairman Voinovich, this is a timely and important topic. You and Ranking Member Carper deserve credit for continuing to hold regular oversight hearings on nuclear issues during this session of Congress.

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I thank the witnesses for coming here to discuss these issues. Along with other members of the committee, I want to acknowledge and thank Chairman Diaz for his 10 years of service at the NRC. I know you will be successful in your future endeavors, and I wish you well.

Senator VOINOVICH. Senator Inhofe, we are anxious to hear your statement that you were the genesis of real oversight of the NRC, and I have tried to carry on, follow your example. I am so glad that you are here today.

OPENING STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. I appreciate it, Mr. Chairman. Let me just say this. I guess, not too surprisingly, when I listened to your opening statement it is exactly my opening statement, so I won't be redundant and repeat it, but I will say this: as far as Chairman Diaz is concerned, I expect this will not be his last hearing. I expect he will be called in as a witness from time to time. He and I have talked about that. He has too much a greater abundance of knowledge to just turn loose, so we look forward to that.

Again, I think you stated it well, Mr. Chairman, that in 1997, when I chaired this subcommittee, we had gone about 12 years without a hearing. Let me tell you what is unusual about this, Mr. Chairman. It is unusual for any bureaucracy to be receptive to oversight. This is what I had seen. I have talked to different members of the NRC in the staff level, and they have been very receptive to putting deadlines down. I think now it is even more important than it was in 1997, Mr. Chairman, when we first started looking at this, because I think most of us on this panel realize and accept the fact that we have an energy crisis and that we are not

going to resolve the crisis without enhancing our nuclear capability.

I am looking forward to working with you. I have to say, too, there is no one who is better to chair this subcommittee than Senator Voinovich, who has probably forgotten more about air issues than I will ever know. So I look forward to working with you as we monitor the progress of the salvation of our energy crisis.

Thank you, Mr. Chairman.

[The prepared statement of Senator Inhofe follows:]

STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

I first want to thank Chairman Voinovich for holding this oversight hearing and for his continued commitment to strong oversight of the Nuclear Regulatory Commission (NRC). This is the ninth in a series of oversight hearings that began in 1997 when I was chairman of this subcommittee. Prior to that first hearing, there had not been an NRC oversight hearing in more than a decade.

I want to commend the NRC for making substantial progress over the past year towards safely advancing the future use of nuclear power. As you all know, the initial groundwork was successfully laid through the passage of the Energy Policy Act of 2005. This Act provided critical provisions such as—NRC reforms, security, liability insurance, and human capital—combined with the Energy bill's sections on risk insurance, production tax credits, and loan guarantees provide the foundation for the construction of new nuclear plants.

In addition to successfully implementing these new provisions, we must also address other key issues pertinent to building new nuclear facilities.

I am encouraged by the expected increase in combined construction and operation license applications (COLs) over the next 4 years. Only one year ago, the NRC was planning to review one Combined License Application (COL) while preparing for three COLs in FY–07. Today, that number has been revised upwards to two COLs while preparing for nine COLs in FY–07.

I commend the NRC for being proactive in meeting this new increase in workload by implementing a design-centered approach which will further help to streamline the review process of like designs. However Mr. Chairman, I must add that I remain wary of the challenging task ahead of the NRC in reviewing licensing applications. I would like to see more proactive initiatives by the Commission in promoting efficient processes such as the design-centered approach instead of requesting additional yearly funding increases to meet increase workloads.

I was pleased to hear the Chairman state from the last hearing in March that the final rule for 10 CFR 52 is expected by the Commission from the staff in October 2006. I sincerely hope that the Commission will place a very high priority on the expeditious review of this rule as regulatory certainty is premium to the future of the nuclear industry.

As per my comments from the last hearing, I would like to continue to caution the NRC about the soon to be implemented safety culture-related enhancements. I intend to fully monitor the implementation of the safety culture approach to evaluate licensee actions to address identified performance issues. We must not let this program turn into a bean counting exercise.

I would especially like to thank Chairman Diaz for his service to the NRC and our country. Mr. Chairman, without your help, support, and leadership at the NRC, I don't think we would be able to even discuss building new nuclear reactors. Thank you for everything that you have done and I wish you well in your retirement.

In conclusion, I would like to thank everyone for attending this very important oversight hearing. The NRC and the industry must keep safety as the center of all that they do, and I will continue to support Chairman Voinovich in making sure that remains the case.

Thank you.

Senator VOINOVICH. Thank you. Senator Carper.

Senator CARPER. Thank you, Mr. Chairman.

OPENING STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

I hate to pile on here, Chairman Diaz, but I am going to anyway. I don't know that the chairmen of regulatory bodies ever take victory laps, but you are almost entitled to today. I join my colleagues in expressing our thanks for your leadership.

If you think about it, over the least 10 years or so we have seen, I think, a growing recognition of the need for nuclear energy, safe nuclear energy, and I believe not just the perception of the industry is that it is safer and more reliable, but I think that is the reality, too. You and those who serve with you deserve a whole lot of the credit, and so does the industry, itself. So I wish you well. Thank you. We look forward to crossing paths again many times in the future.

It is no secret that a renaissance is underway in nuclear power today. I welcome that. Today at least 15 companies I am told or groups of companies have announced intentions to build new nuclear plants with the intention of filing applications with the NRC in the next 1 or 2 years. In addition, almost half of the current nuclear plants have renewed their license to continue to operate, and additional 18, I am told, have applications being reviewed. We can expect most of the current people will apply for renewals soon.

I don't know if we pay you guys overtime, but you are probably going to be eligible for it before long.

Although the Department of Energy continues to push back its time line, we can assume that in the near future they will apply for license to operate a nuclear waste repository.

The future of the nuclear industry literally begins and ends, I believe, with the Nuclear Regulatory Commission. That is you. It is a very big responsibility and one that I believe the Commission, with its leadership that you have provided, Mr. Chairman, responsibility that the Commission manages well.

As you know, I am a believer in nuclear power, and heartened by this resurgence. Lately there has been a lot of discussion about this nuclear renaissance; however, I want to make sure that our focus on potential new plants has not resulted in our forgetting about our current plants. The public trust in nuclear power must be reassured, and that reassurance must start with our current fleet of plants.

When this fellow and I were Governors together and we'd meet with our cabinets, I don't know what he would say to his cabinet or staff, but I was always reminding them about particular things we were doing in my little State of Delaware and saying, "If it isn't perfect, make it better." That was our motto. That was our creed. If it isn't perfect, make it better. I think that certainly applies to what you do and what our nuclear industry does. If it isn't perfect, let's make it better. None of us are perfect. We can all do better.

Over the past couple of years, you have been faced with tritium leaks, with unplanned shutdowns, with lost fuel rods, and a host of other problems, so there is still work to do. But I would urge you and those who succeed you, Mr. Chairman, your colleagues, to work every day to make sure that every nuclear powerplant in the United States is striving every day toward perfection.

We are all aware that the coming years are likely to require a significant increase on our energy production. I wish that weren't true, but if the past is any prologue for the future, it is likely to be the case. I believe that most of us realize the need to have a broad portfolio of energy resources, and nuclear must remain a prominent place in that portfolio.

To make sure that nuclear power fulfills its future potential, the NRC must fulfill its current oversight missions, and today we renew our pledge to work with you toward meeting that goal.

Thank you all very much. Thank you, Mr. Chairman.

Senator VOINOVICH. Thank you, Senator Carper.

Senator Isakson.

OPENING STATEMENT OF HON. JOHNNY ISAKSON, U.S. SENATOR FROM THE STATE OF GEORGIA

Senator ISAKSON. Thank you very much, Mr. Chairman. I appreciate the hearing and I am delighted to be here to pile on and pay my respects and great tribute to Chairman Diaz and all the work that you have done. You have done an outstanding job and we are very appreciative.

I am also very delighted that Barnie Beasley from Southern Nuclear is going to be testifying on the second panel, and I am delighted for a particularly specific reason. Although I don't personally know him, I was first elected to Georgia Legislature in 1976 when Plant Vogtle was in the process of being licensed and subsequently constructed in Georgia, and I ended up on the Industry Committee which oversaw electric utility generation and gas utilities. I saw Southern Nuclear build a plant during a time of spiraling interest rates, spiraling construction costs, and double digit inflation, not to mention the fear at that time of what nuclear energy really would do.

I shudder to think where we would be today in the United States of America had we not taken that venture and had companies like Southern Nuclear not taken the tremendous risk to build the plants that have provided a significant amount of safe, non-polluting energy to the people of the United States and will be, as the Chairman referred a minute ago, one of the key saviors for all of us in the future demands that will be put on us to have more energy but be sure we are accountable to our environment.

I am delighted Mr. Beasley will be testifying, because he supervised construction, supervised initial startup and operation, and managed the nuclear plant that still today in Georgia, some 26 years later, is supplying safe, reliable nuclear energy, electric energy, to our people in an environment that is friendly and a process that is friendly to our environment. I think that type of testimony will be invaluable.

I look forward to working with the Commission in the months and years ahead as we expeditiously but steadfastly oversee the licensing of new reactors and the expansion of nuclear energy in the United States of America.

Thank you, Mr. Chairman.

Senator VOINOVICH. Thank you, Senator Isakson.

Senator Lautenberg.

OPENING STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM THE STATE OF NEW JERSEY

Senator LAUTENBERG. Thank you, Mr. Chairman. Thanks for holding this oversight hearing on the Nuclear Regulatory Commission and its process for licensing new and existing nuclear plants, and I, too commend you, Chairman Diaz, for a job well done. How would you react to days without problems if you are not doing this job? It keeps you on your edge, right?

New Jersey gets most of its power from nuclear, and so I understand that nuclear power is an important source of energy in our Nation today and its importance could very well increase as we seek ways to reduce our dependence on foreign oil and address the challenge of global warming.

It is so funny because it wasn't too long ago that nuclear power was almost an unmentionable in these quarters, and now we see the volume of interest pick up considerably. So I think that calls for more from the NRC in some ways because nuclear power is important, but nothing is more important than the health and safety of our citizens, including those who live near the nuclear powerplants.

The last time the NRC came before this committee in March I expressed my view that the only way nuclear power will gain greater acceptance in our country is if the NRC acts as a strong watchdog, not an industry advocate. As a first step toward that goal, I think the NRC should consider whether it sufficiently welcomes public comment and participation during the licensing process.

I am led toward that view because the Oyster Creek facility in New Jersey, the oldest operating nuclear plant in the United States, has applied for a 20-year renewal of its license. Many parties, including the State of New Jersey as well as environmental and consumer groups, have petitioned the NRC with concerns that ought to be reviewed. But it appears that the NRC's current licensing process does not seem to encourage public participation as I think it should.

The State of New Jersey's petition for the NRC to consider the potential vulnerability of Oyster Creek to a terrorist attack was rejected almost summarily by the NRC's Atomic Safety and Licensing Board, and that decision is currently on appeal before the full Nuclear Regulatory Commission. I have said it before, if the NRC and the nuclear power industry are truly interested in expanding the use of nuclear energy in this country, they have to do more to gain public acceptance of the idea. That is not going to happen as long as the concerns of ordinary citizens are not seriously considered.

I look forward to hearing from our witnesses Mr. Chairman, and, once again, I thank you for calling this hearing.

Senator VOINOVICH. Thank you, Senator Lautenberg.

Chairman Diaz, Commissioners McGaffigan and Merrifield, Jaczko and Lyons, I am glad that you are all here today. We appreciate your coming here for this oversight hearing.

Mr. Chairman, we are going to provide you with 5 minutes to give an opening statement, and any Commissioners that want to provide additional comments will have 2 minutes. You can begin when you are ready.

I want to make it clear that we are just going to be able to have one round because what I understand is that we are going to have stacked votes starting at 11 o'clock, so we are going to try to move through, try and get as many questions as we can answer.

Chairman Diaz.

STATEMENT OF NILS J. DIAZ, CHAIRMAN, U.S. NUCLEAR REGULATORY COMMISSION ACCOMPANIED BY: EDWARD McGAFFIGAN, JR., COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION; JEFFREY S. MERRIFIELD, COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION; GREGORY B. JACZKO, COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION; PETER B. LYONS, COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION

Mr. DIAZ. Thank you, Mr. Chairman and members of the committee. Again, it is a pleasure to be here and to appear before you today on behalf of and with my fellow Commissioners to discuss the U.S. Nuclear Regulatory Commission's programs, particularly those that we are implementing to exercise our statutory responsibility for comprehensive and timely licensing reviews of new nuclear powerplants.

The Commission appreciates the support that we have received from the committee on many issues of key importance, to the discharge of our responsibilities, including legislative, personnel, space needs, and budgetary support. All these are needed for the Agency to achieve early and complete enhancements to safety and security programs and to prepare and structure the Agency for reviewing many new reactor applications concurrently.

Since we last spoke to you in March, the Commission has successfully completed additional actions to implement provisions of the Energy Policy Act of 2005, including issues of proposed rules on the design basis threat and the protection of safeguarding information that is submitted to the Commission, and final rules on the national resource tracking system, import and export controls, implementation of the revised Price Anderson Act, and the elimination of NRC antitrust reviews.

Turning to reactor licensing, our tendency of our part 52 establishes a framework for new reactor licensing reviews, including applications for permits, design certifications, and combined licenses. This framework is intended to result in a combined one-step construction and operating license. It is intended to resolve the risk at the front end prior to major construction and financial commitment by the applicants. The NRC continues to put in place a comprehensive licensing infrastructure to conduct a review of anticipated combined license applications, including, as of yesterday afternoon, the 18 announced applications for up to 25 units beginning in 2007.

This graph shows our anticipated workload. The staff is planning to implement a design centered approach to efficiently review multiple combined license applications in parallel. We believe this approach is crucial to completing timely reviews for multiple applications and is founded on the concept of one issue, one review, one position for multiple applications. It will optimize the review effort and the resources needed.

Standardization remains the key to these efforts, and I mean standardization across the board, inside and outside the Agency. Using this approach, we estimate that the first COL reviews for the four referenced design will require about 30 months. I believe this timeframe could drop to 24 months after the year 2010 as the Commission and the industry gain experience with the process. Although a design centered approach will lead to efficiencies in the safety reviews, each site must also receive a custom environmental assessment and review.

For example, we can be dealing with four COL applications and completing one of 18 environmental assessments at the same time. Each site will be in that sense unique, and the timetable for each review may vary as a result.

It is desirable that these environmental issues be resolved early in the process, and the Agency needs to know when, what, and how they are going to be done.

The number and the schedule for new reactor applications continues to change and they have changed, sometimes daily. The intensity of our efforts will require that the right people are in place with the right tools in hand and in the right offices by the fall of 2007. We have achieved a net gain of 200 staffers right now. We expect to increase staff by 550 staffers over the next 2 years. We are enhancing our office space and infrastructure by working with the GSA to acquire additional office space. However, there will come a time when the NRC staff cannot take on more work without affecting their required schedules. We are now approaching that level.

I have, therefore, challenged prospective new reactor applicants with two things. First, the early site permit, design certification, or the combined license applications must be acceptable for docketing by the staff. This implies a high quality application.

But that is not sufficient. The industry should ensure that each application contains the necessary and sufficient documentation for their review to be finished in a timely manner. With such applications in hand, I am convinced that the Agency has the safety and environmental decisionmaking capabilities to act in a timely manner and serve the need of the American people.

The NRC understands and is committed to fulfill its role in new reactor licensing without missing a step in ensuring the safety and security of the 104 operating reactors.

On a personal note, Mr. Chairman, it has been my privilege to work with you, Senator Carper, and members of the committee, and I urge your continued support for the critical tasks that the Nuclear Regulatory Commission needs to perform well and on a schedule in a manner that meets the need of our Nation and benefits our people.

Thank you very much.

Senator VOINOVICH. Thank you, Chairman Diaz.

Would any of the other panelists want to take advantage of an opportunity to share some observations?

Commissioner McGaffigan?

Mr. MCGAFFIGAN. Thank you, Mr. Chairman. I am going to use my 2 minutes to join you and the other members of the committee in praising my colleague, Nils Diaz, as he prepares to leave office

in the next 8 days. Nils happens to be a Republican, I happen to be a Democrat. We have served together on the Commission for over 9½ years and have never faced a partisan issue during that period.

As he leaves office, he is the second longest serving Commissioner and the fifth longest serving Chairman in NRC's history. Nils, both as Chairman and Commissioner, has been a man of action. Upon assuming the chairmanship in April 2003, he told one interviewer that when in doubt he would act. I have always appreciated that quality in the Chairman. It is an instinct that I share.

Because he has acted, the Commission is a much better organization today than the one to which he was appointed in August 1996. He has made only a few mistakes—namely, the times he voted opposite me—but the accomplishments are far too many to cite in this brief time. The heart of these accomplishments is that NRC today is a much more effective, disciplined, forward-looking, predictable, and transparent organization. I believe that Nils will be remembered as one of NRC's greatest Commissioners, and I am glad to have had the opportunity to serve with him.

I wish him and his wife, Zena, and their children and grandchildren all the best as he decompresses from the stress of the past decade in his beloved Tampa Bay home.

I will also add this might be the last time we appear before the committee with Senator Jeffords on the panel. I think he has been a tenacious and fair overseer of NRC's performance and a partner of Senator Voinovich and Senator Inhofe in overseeing us these past 8 years, and we appreciate his work and wish him all the best in retirement, as well.

Thank you.

Senator VOINOVICH. Thank you, Mr. McGaffigan.

Mr. Merrifield.

Mr. MERRIFIELD. Mr. Chairman, I would also like to thank you and the other members of the committee for your kind comments about Chairman Diaz. Nils and I have worked together for 8 years. Ed has done an excellent job of listing the accomplishments that Nils has had, and I couldn't do anything better than concur.

I also want to concur in the comments made by Commissioner McGaffigan on Senator Jeffords. I have worked together with your staff when I was a staff member on this committee and I recognize the strong accomplishments you have made in moving the EPW Committee forward and I thank you for that and for the oversight of us.

Senator JEFFORDS. Thank you.

Mr. MERRIFIELD. One additional comment I would want to make. In our last hearing in March, Chairman Inhofe, you asked me to be the point man on issues associated with the hearing process in our Agency, and I wanted to just briefly comment on that.

Over the years, with the concurrence of Chairman Diaz, I have taken the lead in the interviewing of potential judges for the panel we have. I think we have done an excellent job in bringing together a new group of judges who are talented, effective, efficient, and fair. I think that will bode well for our hearing processes down the road.

We have revised our hearing procedures in part two of our regulations, and I think that will make for a more disciplined and timely program moving forward.

The Commission has taken the very aggressive role, of which I have been a strong proponent, to set time lines, effective time lines for those boards in moving forward, and I think we are doing a better job of that today than we were when we first joined the Commission.

We have also asked for a series of recommendations from our staff as to how we can enable further efficiencies in our review in the hearing process associated with the combined operating license applications that have been outlined previously. We expect to get those recommendations to us in the next month or so, and that is something I think the Commission will need to act on.

As you requested, Mr. Chairman, I am attempting to work very strongly on this issue. It is an important effort to make sure that we review these applications with a discipline and fairness that Senator Lautenberg has discussed, and we certainly want to make sure we are doing our mission to review these in a disciplined way, in a timely way, and in a full way to make sure the issues are brought out in review.

Thank you, Mr. Chairman.

Senator VOINOVICH. Mr. Jaczko.

Mr. JACZKO. Mr. Chairman, if I could add to the theme, I guess, of piling on a little bit today, I would also want to recognize Chairman Diaz for his contributions to this Agency and certainly his contributions to the Nation over the last 10 years. He has been, I think, a very good example for the Commission of what a commissioner should do, how a commissioner should act and represent this Agency and this Nation. I certainly have learned quite a bit personally from him.

I also want to similarly congratulate Senator Jeffords on his work and the things that he has done. I had the opportunity to be a member of his staff for a brief period of time and I certainly enjoyed that time.

I would like to add a little bit to what has been said on some of the issues and challenges facing this Agency as we look to dealing with new reactors. I think, as many people have said, one of the most important issues will continue to be ensuring the safety of the existing fleet of operating reactors, and I think that is something that is easy for us to say. It is going to be something that is important for us to actually implement.

I think, as there is a tremendous amount of emphasis and effort put into the new reactors, we must make sure that we continue to keep focused on our existing fleet. I think there are a variety of ways we can do that. I think many of those have been mentioned by you and other members of the committee.

As we go forward, I think it will be important for us to continue to keep that focus on the existing fleet and the other regulatory responsibilities that we have as an Agency.

Thank you.

Senator VOINOVICH. Thank you very much.

Mr. Lyons.

Mr. LYONS. Thank you, Mr. Chairman.

I would also like to join my colleagues in expressing appreciation for the leadership of Chairman Nils Diaz. Chairman Diaz certainly provided a very important role model for me as I began on the NRC about 17 months ago, and through his guidance and leadership, I have learned how to help maintain the NRC as the premier nuclear regulator in the world today.

I would like to comment just briefly on one of Nils' legacies, and it ties in with the fact that I returned very late last night from an overseas trip. Nils provided the vision for the multi-national design approval program (MDAP), a vision in which the United States, working with international partners, can try to move toward sharing of information on regulatory processes as they apply to particular reactors. On this trip I was in Finland, together with some of the senior NRC regulators, at one of the first meetings on the MDAP, discussing their work on the EPR reactor, in which a number of companies are expressing interest in this country, as well.

By participating in that meeting, it was very evident to me that Chairman Diaz' vision for this program and its ability to help the NRC move forward expeditiously in licensing of that particular kind of reactor, was indeed very well founded.

Again, it has been an honor and a privilege to work with Chairman Diaz, and I look forward to the hearing today.

Senator VOINOVICH. Thank you very much. I am sure the Chairman would say that you are only as good as your team, and I think you have had a good team working with you, Chairman Diaz.

Mr. Chairman, a stable and predictable licensing process is an absolute must if we are to proceed with constructing new nuclear powerplants in the country, and to meet the ever-growing interest in constructing these plants the Commission has developed a "design centered approach" so that multiple applications can be handled at once. This depends upon standardization of the applications. However, we found out at the last hearing in March that the NRC is changing all of the licensing rules while the companies are in the middle of preparing their applications.

Mr. Beasley's testimony also indicates that many of the proposed changes actually conflict with the Commission's stated intent of devising a stable and predictable licensing process.

Could you respond to these concerns? Additionally, the Commission committed to completing these regs by mid-January, and I would like to know if you are still on track and if there is any way that the process can be sped up.

Mr. DIAZ. Yes, Mr. Chairman, it would be my pleasure to address those concerns.

I believe that, you know, the concerns are not really as large as Mr. Beasley seems to believe. The changes to Part 52 are made to make Part 52 more effective, to actually take out things that were not working out. It was large. I agree, it was a large number of changes, and many of them are almost, you know, minor corrections. Part 52 has already been, you know, put out for——

Senator VOINOVICH. What is it again?

Mr. DIAZ. Part 52. The rule was put out for comments. We received 19 comments, most of them from industry and three from stakeholders. We are about ready to resolve those comments. We are on track to have that rulemaking delivered to the Commission

by October, and the Commission will then deliberate on the new rule. It should be done before the end of the year.

We do not believe it impacts on the licensees' capabilities to submit these applications. The reason is that the rule is out. Most of the changes are very obvious. They can go ahead and proceed to do their COLs. At the end, Part 52 will be better than what we started with.

Senator VOINOVICH. Mr. McGaffigan.

Mr. MCGAFFIGAN. Mr. Chairman, just so we don't always agree, I believe that many of Mr. Beasley's points are well taken. I think we are going to have to jettison a fair portion of this rule in order to finalize it in the time period that is talked about. I do think many of the provisions in the rule, as I said when I voted on it—and I voted against it—run counter to the philosophy of the 1992 Energy Policy Act, and I hope—the staff has more or less promised us that they will jettison large chunks of this rule in order to present us a rule that is workable going forward. I hope that is the case.

Mr. MERRIFIELD. Mr. Chairman, very briefly, I did support Part 52. I had a number of discussions with Mr. Beasley, and I think he has articulated his view quite clearly. I think we have worked and have engendered an effort on our staff to work in a way that is open and try to get a dialog with many interested parties to make sure that there is enough understanding about what we are intending. I think this effort will result in improvement in our effectiveness and efficiency. Like others, I believe we are going to have to take a look at the product of our staff and make sure that some portions may work, some may not.

I believe, given the discussions and the commentary you are going to hear from Mr. Beasley, we may be well disposed to have an additional workshop between our staff, industry, and other interested stakeholders to work through some of what I believe are some differences of understanding, not really differences of philosophy. But I think we do have a package that will go forward in the way that the Chairman has outlined.

Senator VOINOVICH. That is very important, and in terms of interest by industry and these applications, if this thing isn't smooth and there isn't good dialog going back and forth, you will just snuff out the great interest that is there right now.

Last issue is the issue of all the other agencies that you have to touch base with. Senator Inhofe and I have seen it in the Highway bill and building highways today and trying to get all the other groups. You have the Fish and Wildlife Service, the Department of Interior, the EPA, and others. Has any thought been made to a process where you can get these folks onboard quickly, and, if there are differences of opinion, how the differences can be reconciled so that does not end up being the thorn in the side of this process?

Mr. DIAZ. Sir, we have reviewed our processes for the environmental review which requires that local, State, and Federal Agencies participate independently of the NRC in those reviews and actually review the application according to the authority that is given to them. Some of them is given by EPA to the States. There is coastal issues. We are now very much in process to be able to address this potential connection.

We have one more Agency that we have to deal with, which is the Department of Homeland Security, and EPACT actually told us to make sure we consult with DHS. As I begin cleaning my office next week before I leave, I would address the issue directly to Secretary Chertoff to make sure that there are no gaps in between the coordination that needs to take place between DHS and the DNRC for the security reviews of the new powerplants.

Senator VOINOVICH. I would like to have, and I am sure everyone else on this committee would like to have, in writing the plan that you have in place and how we are going to speed up that process and reconcile any differences that are there and might suggest that you get a hold of the Federal Highway Administration, because they have done some real work in terms of coming up with ways to expedite the process, but there is always the issue that if there is a real difference of opinion who is going to decide how it should be taken care of. I am interested in that whole process.

Mr. MCGAFFIGAN. Sir, if I could add just one very brief comment, the single most important thing that another Agency has to do in order for these licenses to proceed is for the Department of Energy to enter into new contracts to take spent fuel from these new licensees. They can't get a license under our rules until they have a contract with the Department of Energy to take the spent fuel generated in the new reactors.

Obviously, the old standard contract won't do. A new standard contract is necessary. It is alluded to in Chairman Diaz' testimony for the record. This committee is very interested in waste issues. You don't have to solve all the waste issues, but they have to, before we can issue a license, have a new standard contract with each of the 17 or 18 entities that are going to be pursuing licenses with us.

Senator VOINOVICH. Thank you.

Senator Carper.

Mr. JACZKO. If I could just briefly add, Mr. Chairman, I do think this is also an area where the Commission, I think, needs to set some clear policy guidelines. We had a situation with an early site permit that we are currently reviewing where an applicant had not completed all the State permitting actions that they needed, and that caused a significant delay then with the entire process.

I think as we go forward and potentially look at more and more applications we need to set some clear guidelines that applicants need to resolve as many of those issues as they can, particularly the State issues, before they come to the Commission and begin our process so that we are not utilizing resources that could be better spent on other applicants.

Senator VOINOVICH. That is why I would like to see something in writing about how you are going to do that.

Senator Carper.

Senator CARPER. Thank you, Mr. Chairman.

I just want to make a personal note. I am a person who rarely complains about being too cold, but I just noticed that the water in my glass is starting to freeze. I have never seen that happen before. Whoever controls the temperature in here, if you want to jack it up a degree or two I won't complain.

Another observation, it is rare that we actually have all the members of any particular commission who come and testify before us, at least on my other committees that I serve on now or in the House. That is sort of unusual, but I think it is a very good thing, and I think it is a tribute to you that you are able to come here and agree where you do and maybe offer different points of view, but to do so in a respectful, constructive way. That speaks well for all of you, and especially for the leadership that you provide, Mr. Chairman.

This may have been raised while I was out of the room by Chairman Voinovich, and if he has I apologize, but I want to raise it again just for my own interest.

We have talked about all the work that needs to be done, the folks that need to hire, train, and the question that I have is, at least to start off, in looking at the workload that is ahead and the kind of bodies and minds that you need to recruit, what can you share with us about your ability to find the people you need and your ability to hire those people?

Mr. DIAZ. Thank you, Senator Carper. We are doing well. We got ahead of the curve, and before practically everybody got on the same route as ours we are hiring the right people. We have been able to hire the numbers that we wanted to. I think we will meet this year or exceed our goals.

We have, like I said in my testimony, more than 200 net staffers have been hired this year. We might get close to 225 by the time we end. We are better prepared to train them. We are moving into new space. Our professional development center will be moving in 2 months to Bethesda. We have a building within just two blocks now where our new fuel cycle office will be moving to.

We are having some problems with equipment for our people, but by October, we will be able to take care of that. But the answer, sir, is that yes, we have been able to find the right talent. We might find the competition getting a little bit stiffer as we go forward.

Mr. MERRIFIELD. Senator Carper, I would just say I think we have done very well, not only at the entry level but also throughout the levels. We have a lot of people in their mid careers who are coming into the Agency who are very skilled and talented and that equal or exceed the people that they are replacing.

In terms of new hires, as the Chairman said, we are ahead of the curve. We are bringing in a very high level, talented, skilled, energetic workforce that is diverse. We want our workforce to look like America. I think we have had a lot of success in meeting that goal.

Senator CARPER. Good. Mr. Lyons.

Mr. LYONS. Senator Carper, I would just emphasize one of the points that the Chairman made. I think this is not only a continuing challenge, but probably a growing challenge. If industry does move ahead with their construction plans, that competition for new talent is going to become intense, so we need to keep up.

Senator CARPER. Good. Thank you.

The second point I would like to raise, I think we are going to hear from our next panel about the need for timely decisions from the NRC. We have already talked about that. You have already mentioned this in some of your testimony. Could you just describe

to us again what issues are within the control of the NRC to make timely regulatory decisions and what issues may cause regulatory delays that are out of the control of the NRC?

Mr. DIAZ. Sir, the Part 52 process tends to be very disciplined, and this is why we have been insistent that we get the right kind of application, not only with the beginning in mind but with the end in mind. The kind of decisions that we have to make are essentially divided into those technical decisions and the legal decisions. In between those two you can also classify them as environmental or purely technical.

We see our technical decisionmaking as being very well already structured. We see the issues of the environmental reviews as requiring a significant amount of effort because each one is going to be different. They are all going to be coming in at the same time.

The adjudicatory processes that Commissioner Merrifield has taken a particular interest in also require a particular attention. The design centered review process intends to solve first the technical issues in parallel. Once an issue has been solved for a reference application—you know, we are going to have four reference applications—it goes to the rest of the group.

The same thing could happen in some of the issues that are either contested or that are addressed or in the legal processes. They should be able to get something that is done for the reference and it applies to the rest of it, except, again, those that are site specific. The site-specific issues will have to be resolved. That is what I emphasize, the fact that those need to be done early in the process because if not they could delay the actual finalization.

Mr. MCGAFFIGAN. Senator Carper, I am glad that both you and Senator Voinovich have focused on the things that are out of our control, at least to some degree. I mentioned the DOE issue. I think it is right to focus on the various issues that come under State government control effectively. The licensee either works it out with the State government, water rights issues, or Coastal Waterways Act issues, Historic Preservation Act issues, Endangered Species Act issues, or our hearing process becomes a very, very inefficient way to work those things out between the licensee and the State.

So the more they can get done before they come in, the better. If DOE can figure out what its new standard contract looks like, the better. Then you can blame us if we don't meet time lines.

Senator CARPER. Thank you. My time has expired, but I will have a couple more questions for the record, but thank you very much.

Senator VOINOVICH. Senator Inhofe.

Senator INHOFE. Thank you, Mr. Chairman.

I think Senator Carper brings up something that is worth talking about a little bit more. Let me share an experience that we had out in Oklahoma. Our Tar Creek Superfund Site is the most devastating one in the Nation. It was one where nothing happened for 20 years.

When I became chairman of this committee, it occurred to me that if we don't get it done while I am chair, it ain't ever going to get done. So what we did was we got everybody in one room. We had DOI, DOJ, EPA, everyone who had anything to do with it,

Corps of Engineers and all that, only to find they had never really all talked in the same room together.

It seems to me, when I listen to some of the problems that you are having in putting your new procedures together, it might be a good idea to put a meeting such as that together, because it can't happen when you don't have everyone in the same room. I would only suggest that.

Now, going back to the hearing, the first hearing that we had 7 or 8 years ago we have referred to several times, at that time the chairman was Jackson, as I recall, and they had said that new licenses at that time would be something in excess of 5 years. Then she made the commitment at that time that it could be done in less than 2 years.

Now, keeping in mind all these things that you don't have control over, but still the fact that you know they are out there, what would you, on your departure, now say Chairman Diaz that you are going to be able to do in terms of the time? Do you want to reduce that time line? Then I will ask any of the others who will remain here after you are gone what their idea is.

Mr. DIAZ. Sir, I think I am going to let my fellow Commissioners answer that. They are going to have to be dealing with it. But, to be fair, we have looked at how we can actually provide more consistency in the time schedules, and——

Senator INHOFE. No, we were talking about relicensing at that time.

Mr. DIAZ. Yes. But right now we are trying to come up with what we call a "master schedule." This master schedule would actually try to incorporate into one single document all of the milestones that need to take place.

I think one significant idea that we will have to go forward with is how do we share that with all the cognizant agencies that need to intervene in the process, just to make sure that people realize where we are, where we are going to be in time. I am sure that my fellow Commissioners will be watching that master schedule very well.

Senator INHOFE. Is that true, fellow Commissioners?

Mr. MCGAFFIGAN. Mr. Chairman, I am personally very uncomfortable with the sort of schedules that we show here with vast numbers of people getting licenses in 2010 and 2011, because we didn't have the chance we had in license renewal. In 1998 when we were before you we had a Oconee and we had Calvert Cliffs as sort of lead plants for license renewal. We could learn, we could issue a lessons learned document after doing them. We could then deal with the bow wave.

Here we are getting the bow wave before we have learned, and I personally am dedicated to getting at least someone across the finish line if they can meet all of our criteria. Then I think once we get one across we will get the second, we will get the third, we will get the fourth. But to get 16 across in about a 1-year period, especially when we are losing so many talented senior staff and replacing them with good staff but people who don't have 30 years experience with the Agency, it is going to be very tough.

We will do the absolute best we can. I promise you that. But I personally am uncomfortable that we are going to get this entire

bow wave across the finish line in 24 to 30 months, which are the times that are sometimes bandied about.

Senator INHOFE. I am sorry to hear that.

How about you, Commissioner Merrifield?

Mr. MERRIFIELD. Mr. Chairman, I am more optimistic than my fellow Commissioner. I think we demonstrated through the license renewal process. We told you the first ones would come in in about 36 months. We actually came in at 32. Under Chairman Jackson, we told him we thought we could regularize it at about 24 months.

Our license renewal process today runs between 16 and 18 months. So I think we have made tremendous progress on our efficiencies. I think we can leverage that in the work that we are doing for combined operating license applications. I think we are demonstrating with the review of the enrichment applications, both with the LES project in New Mexico and the USEC project in Ohio, that we can do them more efficiently.

We have work ahead of us. It will be a challenge. I think we have the staff and the capability of meeting the kind of time lines we talked about, and certainly that will be my dedication during the time that I am on the Commission.

Mr. JACZKO. If I could?

Senator INHOFE. Yes, Commissioner Jaczko.

Mr. JACZKO. I would probably tend to fall a little bit more on the pessimistic side for how we can complete some of these reviews within the 24 to 30 months that have been suggested. I think one of the components that is often forgotten about is that we do have a very public hearing process, and I think, as Senator Lautenberg mentioned, it is important that that process ensure that people have access to our hearing processes and that they have a fair shot at raising their concerns. I think that can be a very timely and a very lengthy process, and it is also one that is very much outside of the control of the NRC.

So I think making sure that that hearing process has good access for people will give them good buy-in in the final outcome for any licensing decision, which has the added benefit of not having NRC actions challenged in Federal court, which I think ultimately is one of the areas where we can have significant delays. So we are really making sure we have good public participation.

Senator INHOFE. I think the statement was made about stability and predictability, which is very, very important. I think of those out there who are pursuing licenses, that it is very important that they know what the rules are going in, that they know what they are going to have to comply with, that you guys don't change things in the middle of the road. This is the most frequent concern that we hear, not just from this area but from all forms of government.

It is always easier, Mr. Chairman, to say, "Well, it is going to be more difficult. We can't commit to it." I'd rather get a commitment and stick with it.

Yes, Commissioner Lyons.

Mr. LYONS. Senator Inhofe, please put me down in the cautiously optimistic line.

Senator INHOFE. I don't have a column for that. Thank you very much.

Mr. LYONS. I recognize that it is an immense challenge.

Also, I believe that our approach, which we have described as designed centered (trying to come up with a single set of approvals for one given design) is absolutely essential. We need to stick with that. Industry needs to stick with that.

Senator INHOFE. Thank you very much. I thank all of you.

Senator VOINOVICH. Senator Lautenberg.

Senator LAUTENBERG. You know, as we look at the renewal license for Oyster Creek, we see community groups for it, community groups against it, some public officials in New Jersey for it, some against it. To confirm the fact that the public has to be more ardently considered, we go back and the 9th Circuit Court recently ruled that the NRC must consider the environmental impacts of a terrorist attack when conducting an environmental impact statement. The New Jersey Department of Environmental Protection has petitioned NRC for a public hearing on the threat of terrorist attack, which is very much on people's minds in considering the potential renewal of the Oyster Creek license.

Now, after our experience or 9/11, what role should the threat of terrorism play in considering new licenses or renewals of existing ones, Mr. Chairman?

Mr. DIAZ. Well, sir, we have actually, under the Atomic Energy Act, imposed a significant number of new requirements on existing powerplants. The majority of those requirements and the lessons learned from almost 5 years of exercising safe and secure oversight over these facilities are being incorporated for new reactor licensing. So we intend to make sure that every new reactor that is licensed in this country that comes, you know, in this way, or whichever way it comes, actually complies with the security requirements that have been imposed first by order and now by rulemaking.

We believe that this package is very complete, it is comprehensive. The industry has already put most of those things in place, if not all, and they do provide substantial assurance that public health and safety will be protected from terrorist attacks.

Senator LAUTENBERG. Well, any examples of changes that were made? I mean, very frankly, I am not sure that attacks from a terrorist, with the damage that it could wreak, is part of the routine examination.

Commissioner Merrifield, do you want to say something?

Mr. MERRIFIELD. I just want to clarify a little bit regarding the 9th Circuit. When we made our argument before the 9th Circuit Court of Appeals what we really were trying to articulate was that we had a framework for reviewing the threats of terrorism against the plants that we regulate; that we had the responsibility and the authority under the Atomic Energy Act and the Energy Reorganization Act to act, to respond to those threats; that we had a process in our review of the design basis threat at the facilities to look at what we thought was a possible threat and to impose license conditions and, if need be, in some cases orders to put our licensees in a position to best defend against on those very same threats.

We have done that. The Chairman has talked about the requirements we have imposed, over $1.2 billion in costs associated with that for the licensees in the nuclear generating industry.

The argument that we made in front of the 9th Circuit was we have that covered in a different arena. We felt that the National Environmental Policy Act was not the right arena to wrestle with those issues. So basically, what we were claiming was basically we had it covered but we were doing it in a methodology different than under the auspices of NEPA.

Right now we have under consideration with our partners in the Federal Government what the right response is. That is under consideration right now.

Senator LAUTENBERG. Let me interrupt. Where does the petition from New Jersey Department of Environmental Protection stand?

Mr. DIAZ. Sir, that issue is under adjudication right now. The Commission cannot comment at the present time because the Commission will have to sit as judges on the issue, so we cannot comment at the present time.

Senator LAUTENBERG. But this concerns your internal review. What prevents you from commenting on where a petition stands?

Mr. MERRIFIELD. Senator Lautenberg, the way our process works, our staff makes a technical decision based on the regulatory process. If there is a challenge to that by a member of a stakeholder community, that would go before our internal Atomic Safety and Licensing Board, which acts like a district court. If there are challenges to the decision of the Atomic Safety and Licensing Board, the Commission, in its role as an adjudicatory body, would site like an appeals court.

So what the Chairman has said is those issues are currently in front of our Atomic Safety and Licensing Board, which is the initial court of review. We can't comment on that right now because we may have to review that as an appellate body.

Senator LAUTENBERG. I understand what you are saying, but it seems peculiar that, as part of the review, the licensing review, that the court had to get involved, that the petition apparently was not moving along. Do you know when it was filed, the New Jersey petition?

Mr. DIAZ. It was last year.

Senator LAUTENBERG. Whatever the process is, how long should the process take to engage the public concerns about terrorism in the period in which we are now living?

Mr. JACZKO. Senator, we are not wanting to comment specifically on the Oyster Creek situation because we can't. But I don't want to leave you with the impression that the issues of the terrorism analysis in the NEPA context and for the environmental impact statement is there's a unanimous Commission position on this.

I think in the past there has been quite a bit of discussion among Commissioners about the right approach, and I think as this issue moves forward there will continue to be debate. I personally think there is merit to taking some kind of look at the terrorism issues in the NEPA process. I think that can be done in a way that is consistent with an efficient and timely analysis.

Many Federal Agencies do that as part of their environmental impact statements, and I think it is something. We have some additional challenges because we do have this formal hearing process that has been alluded to, but I think there is a way in that context to deal with those issues.

Mr. MERRIFIELD. Just to make it clear, though, the Commission has under consideration right now, as part of the dialog that Commissioner Jaczko has spoken, how do we want to respond to that 9th Circuit opinion. There are a variety of avenues for us in that regard. One of them, as Commissioner Jaczko has mentioned, is to bring the terrorism component into a NEPA analysis.

Other options obviously would be for us to appeal that decision to the full 9th Circuit or, alternative, to appeal that decision to the U.S. Supreme Court. All of those issues are currently under consideration by the Commission, so we are not in a position to comment on our decision as a whole. That decision is in concert with our counterparts in the Federal family.

Senator LAUTENBERG. I am not asking for that. What I am asking for is to get some understanding about how serious the terrorism consideration might be, and, thus, why can't these things be expedited in the interest of a review for license.

Mr. DIAZ. Well, sir, we will take your concerns seriously. I am sure that the entire Commission agrees that this issue shall be dealt with as expeditiously as possible. Sometimes there are difficult issues. We want to make sure that everybody is heard, but we will take it under consideration.

Senator LAUTENBERG. Thank you.

Senator VOINOVICH. Thank you, Senator.

I want to remind the members of the committee we have three more witnesses and we have votes that are going to begin at 11 o'clock. In fairness to the witnesses, we have to move along and I am going to have to really limit the questions to exactly the time limit.

Senator Isakson.

Senator ISAKSON. Well, I will help you, Mr. Chairman. I will just make a comment and then I will yield the floor so we can go to the next panel, but since Commissioner Merrifield was the more positive in his response a minute ago, I will make this statement to him.

In my opening remarks, I referred to Plant Vogtle and I referred to the 1970s and the 1980s. During that period of time the biggest problem that nuclear energy had was regulatory uncertainty. It is absolutely essential as we are reopening the development of nuclear power generation that the Commission understand that we need regulatory certainty, not regulatory uncertainty, as it relates to timeliness, as it relates to process, and as it relates to consistency.

I am one who remembers the Washington Public Power System bond default. I remember the difficulties we had at Plant Vogtle and all the byproducts of regulatory uncertainty in a very difficult environment in the 1970s and 1980s. I think that is what all of us here are looking for is a safe, reliable process, but one that is certain, so that people who are risking tremendous capital have the opportunity to deliver on what they should be able to deliver on because they can count on the regulatory process.

Mr. MERRIFIELD. Senator, we have dedicated our strategic plan to be an Agency that is effective, efficient, and timely, and I think all of the members of the Commission take that charge very, very seriously.

In my personal view what we were confronted with in Part 52 is a process that did not meet those criteria. I think what the majority of the Commission has entered into in this process is to up front fix that process in Part 52 to meet that strategic goal, to make it so that all of the parties that are entering into the review process for ordering plants under a combined operating license process can do so in a manner that will allow a decision on the safety of those applications in a way that is going to meet the expectations of the Agency, meet the expectations of the licensee, be fair to the public process and interveners, and make sure we can do it in a way that is timely and does not repeat what we went through with Plant Vogtle and other plants. In my home State of New Hampshire, it was Seabrook that put Public Service of New Hampshire into bankruptcy.

Mr. DIAZ. I am going to disagree with you, sir, on one issue. Commissioner Merrifield is not the most optimistic of this group. In fact, that is how Commissioner McGaffigan and I work together. He is the pessimist, I am the optimist.

Mr. MCGAFFIGAN. I might challenge the Chairman on that one, but I will give it to him because it is his day.

Mr. DIAZ. I am very close to the staff, you know, because of my role. I believe that we are ready to implement what needs to be done. I think this Agency has conformed itself through the years, with the support of the Commission and the committee, into an Agency that realizes what its responsibilities are. I believe our staff can deliver a product in time if we are given the right product from our applicants.

Senator ISAKSON. Well, I hope they keep you on as a consultant in your retirement.

I will yield back the balance of my time, Mr. Chairman.

Senator VOINOVICH. Thank you very much, Senator Isakson.

Senator Clinton.

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

I ask unanimous consent for my full statement to be introduced into the record.

Senator VOINOVICH. Without objection.

Senator CLINTON. First off, I want to wish Chairman Diaz well as you leave the NRC. I appreciate the opportunity I have had to work with you. You certainly have been responsive and very productive in our dealings, and I thank you for that. I want to express my hope that Dr. Kline will have the same openness and responsiveness.

Mr. Chairman, I think this is such an important issue, and I will be following it closely, but I want to focus on another matter that deeply concerns me, and that is the NRC implementation of the Dirty Bomb Prevention Act. I first introduced this legislation in June 2002. There was ample testimony before this committee, before the Foreign Relations Committee, before the Armed Services Committee about the importance of creating a system that can prevent the loss and theft of radioactive material that could be used to terrorize American communities. Clearly there is a lot of it out there. The NRC issued more than 150,000 licenses authorizing the use of radioactive materials for industrial, medical, and other uses,

and there are approximately 1.8 million devices containing these radioactive materials that have been distributed.

We know that since 1998 there have been more than 1,300 incidents where radiation sources were lost, stolen, or abandoned, and in March of this year, the GAO reported that undercover teams had carried small amounts of CCM 137 through border checkpoints, so we know this is a problem.

I really appreciate the help that I got from Chairman Voinovich, Senator Inhofe, and Senator Carper to get the Dirty Bomb Prevention Act through this committee and into the Energy bill last year.

One of the key components of that legislation was the requirement that the NRC set up a cradle-to-grave national tracking system for materials that could be used to make a dirty bomb. So, Mr. Chairman, I was dismayed when I learned that the NRC recently issued a rulemaking on the tracking system which changed the basis for the rulemaking from common defense and security, to public health and safety. The effect of this provision is to move the implementation from the NRC to the States, which means that the NRC will not be in a position to enforce compliance with the system.

The entire motivation for this legislation and for the tracking system was to establish an ability, a capacity for the Federal Government to take steps to reduce the risks that terrorists could obtain radioactive materials. So I want to be clearly on record in strong opposition to this change which runs counter both to the language and to the intent of my legislation. I know that the State of New York has concerns with this proposal, as does California. They may file comments in opposition.

When the NRC considered this change, Commissioners Jaczko and McGaffigan opposed it, and so I would like first to ask Commissioner Jaczko and then Commissioner Merrifield to explain their respective positions on this change which I find deeply troubling.

Commissioner Jaczko.

Mr. JACZKO. Well, I certainly would agree with many of the comments that you made. I think the intention was to have a national source tracking system, and having the NRC as the entity that is responsible for this would ensure that we would be able to implement timely enforcement action if there were situations where we got information that there were problems with sources or missing sources.

So making the change as it was made as I think you referred, from common defense and security to public health and safety takes away some of that authority and gives that to the States, so it adds an extra layer of implementation. I don't think that is the most efficient and effective way to deal with an issue which is fundamentally an issue, I think, of common defense and security for the Nation.

Senator CLINTON. Commissioner McGaffigan, do you have anything to add?

Mr. MCGAFFIGAN. Just that I obviously voted the same way as Commissioner Jaczko. I do think that it is a burden that we are placing on the States. Many of the States have difficult financial issues at this time. It is very interesting that two of the biggest

States, New York and California, who have a very large proportion of the devices, disproportionate, 2 out of 50, were among those who were opposed to it.

We are in a comment period. The comment period ends on July 3d. It is only a 20-day comment period, and July 3d is a day many people will take off, but I do hope that we get comments, and if we get comments then we—in fact, your comments today may be enough to bring this back to the Commission for another round as to whether we really want to make this change.

Senator CLINTON. Well, Commissioner Diaz, I will be sending a letter to you today outlining in more detail my concerns about this issue and asking a series of questions. The letter also includes a request to extend the comment period. It was set an extremely short 20 days.

For those of us who have been working on this now for 3½ years, it is deeply distressing that what the clear congressional intent was was to give the NRC, the Agency with the expertise, the authority to set up this tracking system, and now all of the sudden we are going to disperse it to the 50 States. We are not even giving an adequate time for the State of New York to put together and submit its comments because we have an absurdly short comment period, and, you know, for the life of me I don't know what it takes. We had bipartisan legislation. We had it passed by both houses of Congress. The intent was clear that this would fall under the NRC, and the next thing we know it is going to be sent to the States.

You know, Mr. Chairman, it is hard to understand where the buck stops in the Federal Government on so many of these issues. And so, with all due respect, Chairman Diaz, I would really appreciate an answer to my letter but, more than that, an extension of the time and a reconsideration.

If you need additional personnel or support to do this, for heaven's sake come and let us know, but to send it to States that do not have the expertise, that may not have the personnel or, in the case of New York, are, frankly, you know, stretched pretty thin trying to deal with everything we have, plus having our homeland security funding cut by $40 million, which makes it even more difficult for us to run the 24/7 kind of operation we need to protect New York. So I wanted to raise this in the strongest possible terms, and I will look forward to your response.

Mr. DIAZ. Thank you.

Senator VOINOVICH. Thank you, Senator Clinton. I think that the suggestion about extending the comment period is a very wise one, and I encourage the Commission to give some consideration to that.

I have to shut it off, Commissioner Merrifield, and get on with the other witnesses.

I will say this to the members of the Commission: we are going to leave the record open for a couple of days for members of this committee to ask more questions. I certainly have a lot more to ask, and I am going to direct them to the Chairman, and would appreciate comments from members of the Commission in regard to those questions.

Senator VOINOVICH. Last, Chairman Diaz, one of the things that I did when I was Governor and mayor is when I had somebody that was going out of heading up a department, I asked them to share

with me the memorandum that they put in place to the person that is going to succeed them in terms of the things that need to be done and also the priority of things that need to be done. I would very much appreciate it. I am sure that is what you intend to do.

Mr. DIAZ. Yes, sir.

Senator VOINOVICH. I would appreciate your sharing that with me as chairman of the committee. I would be grateful.

Again, I want to thank you so much for the great service that you have provided, and I would like to thank the other Commissioners for their conscientious service to the Nuclear Regulatory Commission and to our country. I wish you good luck, Chairman Diaz, in your retirement. Take the time. Enjoy it.

Mr. DIAZ. I will, sir.

Senator VOINOVICH. Don't let them get you back working again for a while.

Mr. DIAZ. OK.

Mr. MERRIFIELD. Mr. Chairman, we had a question from Senator Clinton that two of the members who were the minority on a decision were able to answer. Obviously, due to the time period, you want to cut us off, but I would only ask permission to have the opportunity, for those of us who were in the majority on that decision, to be able to supplement our comments for the record.

Senator VOINOVICH. I appreciate that. The record will be open. Without objection, any comments that you have will be put in the record. We will put it in the sequence of this discussion we just had. Thank you very much.

Mr. MERRIFIELD. Thank you very much, Mr. Chairman.

Mr. DIAZ. Thank you, Mr. Chairman.

Mr. MCGAFFIGAN. Thank you, Senator Voinovich.

Mr. JACZKO. Thank you.

Mr. LYONS. Thank you, Mr. Chairman.

[The information provided follows:]

SUPPLEMENT BY CHAIRMAN DIAZ AND COMMISSIONERS MERRIFIELD AND LYONS

Previously, on July 28, 2005, the Nuclear Regulatory Commission (NRC) published a proposed rule in the Federal Register on national source tracking. The proposed rule was promulgated under the NRC's authority to promote common defense and security. The decision to issue the proposed rule under this authority was based primarily on concerns over effectiveness and timeliness: all licensees will need to begin reporting to the National Source Tracking System (NSTS) at the same time, and the NRC was concerned that Agreement States would not have sufficient time to issue regulations to cover their licensees, potentially making implementation of the reporting requirements less effective. After reviewing the comments on the proposed rule, and after gaining more experience with Agreement State implementation of increased controls on radioactive sources, the NRC staff recommended that the basis of the rulemaking be changed from promotion of the common defense and security to protection of the public health and safety. This change in basis would enable Agreement States to oversee their licensees' data reporting to the NSTS. It is important to note that the system itself will remain a national system developed and maintained by the NRC, and Agreement States will not develop or maintain their own databases. The Commission approved the change of basis in an Affirmation Vote dated May 25, 2006, with Chairman Diaz and Commissioners Merrifield and Lyons voting in favor of the change of basis, and Commissioners McGaffigan and Jackzo voting against it. This supplement was prepared by the three concurring Commissioners to document the majority position. Time constraints at the June 22, 2006 hearing only permitted the minority position to be presented.

The Commission majority view is that, in general, the American people are better served when the NRC works in partnership with the current 34 Agreement States, rather than when the NRC "goes it alone." For the NSTS rule, the path the Com-

mission has chosen will allow for more prompt verification that the rule's reporting requirements are being implemented, and for more effective and efficient inspections as a result of the Agreement States' familiarity with their licensees. Further, this approach will reduce unnecessary regulatory burden on material licensees. At the same time, the NRC has mechanisms to ensure national consistency. The rule will be immediately effective upon promulgation, and, because of its direct and significant transboundary implications, Agreement States will be required to adopt program elements that are essentially identical to those of the NRC. In addition, the NRC will monitor Agreement State oversight of their licensees' implementation of the NSTS reporting requirements through the periodic reviews of Agreement State programs conducted under the Integrated Materials Performance Evaluation Program, or IMPEP. The final NSTS rule complies with the plain language of section 651 of the Energy Policy Act of 2005, which requires that the NRC issue regulations establishing a mandatory tracking system for radiation sources in the United States, not later than August 8, 2006. The rule clearly does this. The Commission majority further believes that giving the Agreement States an enhanced role in overseeing the rule's implementation will result in more effective fulfillment of the purposes of section 651.

The NSTS will be a truly national system. The NSTS is being developed, and will be maintained, by the NRC. The system will contain information on NRC licensees, Agreement State licensees, and Department of Energy (DOE) facilities. Licensees will be required to report transactions to the NSTS involving the manufacture, transfer, receipt, disassembly, and disposal of radioactive sources. The NRC has held numerous meetings to engage stakeholders, and to ensure that other government agencies were included in the planning phases for the NSTS. Federal agencies that will have access to information in the NSTS include the U.S. Customs and Border Patrol Service, the Domestic Nuclear Detection Office, and DOE. The NSTS Interagency Coordinating Committee is developing policies and procedures governing requests for NSTS data from other agencies. Agreement States will have access to information on licensees located within their respective States. In addition, Agreement States will have access to the national listing of lost and/or stolen sources to facilitate recovery of these materials.

The NSTS rule imposes data reporting requirements related to source transactions. It does not impose any controls on the use of sources. The actual security and control of the sources is provided by measures imposed pursuant to NRC's authority to protect public health and safety for the majority of licensees possessing IAEA Code of Conduct Category 1 and 2 sources. The NSTS will provide better accountability of the sources and will provide information to the government that was not previously readily available. This information can be used as a tool to enhance both security and safety overall. As a practical matter, safety and security are intertwined in the industrial, medical, and academic uses of materials, and the goal in both safety and security is to prevent the loss of control of material.

The NRC's and Agreement States' experiences with the interim database currently in use demonstrated that Agreement State licensees responded more promptly when contacted by Agreement State officials with whom they were familiar than when contacted by NRC officials with whom they had no history. A similar effect is expected with the NSTS, which will replace the interim database. Of great importance, the Agreement States have further demonstrated that they can issue legally binding requirements in both a timely and consistent manner, as exemplified by their recent implementation of increased controls on radioactive sources. In this effort, the Agreement States are inspecting and enforcing the implementation of these requirements for over 80 percent of the applicable licensees in this country. Therefore, it became no longer necessary for the rule to be based on promotion of the common defense and security for the purposes of expediting implementation. The lead time for the NSTS requirements will be about 6 months from the date of publication of the final rule. The requirements are already laid out in the rule, and it should be a straightforward matter for the States to develop the legally binding requirements.

The time added to inspecting for compliance with NSTS in expected to be minimal, and the NSTS will provide data which will actually simplify aspects of the inspections. For NRC and Agreement State licensees, inspections will be conducted during routine safety and/or security inspections. It is anticipated that no more than 1 hour of inspection effort per licensee will be necessary for the NSTS. The only preinspection effort will be to print the inventory/transaction report on the licensee from the NSTS. It is estimated that the NSTS reporting requirements will apply to about 1,000 Agreement State licensees, and the Agreement States will be responsible for providing oversight, i.e., inspection and enforcement, of their licensees' implementation of these requirements. All licensees should be inspected in the first

year to make sure they have reported their entire inventory of Category 1 and 2 sources. In later years, the inspection effort would be based on reporting discrepancies.

The proposed rule on the NSTS was originally published for a 75-day comment period. Several of the Agreement States requested alignment of the basis for rule with the day-to-day radiation protection activities they conduct to maintain adequate protection of public health and safety. The NRC staff considered the request, and the Commission directed a change in the rule's basis from common defense and security to protection of public health and safety. A 20-day comment period was proposed by the staff and accepted by the Commission because: (1) this rule addressed the majority of the comments received on the proposed rule; (2) the Agreement States were given advance notice of the proposed change; and (3) due to the broad support among the Agreement States for changing the rule's basis, the staff did not believe, at the time, that there would be significant adverse comments on the basis change.

In conclusion, the NSTS rule solely concerns collecting data, submitting it to a national data base developed and maintained by the NRC, and ensuring the data are appropriately updated in a timely manner. Issuing this rule under the NRC's authority to protect the public health and safety in no way diminishes NRC authority to take appropriate action, nor lowers the significance of NRC actions. In fact, the safety of the public is the main reason for implementing security measures for radioactive materials.

Senator VOINOVICH. Our next panel is J. Barnie Beasley, president and CEO of Southern Nuclear Company; David Lochbaum, nuclear safety engineer, Union of Concerned Scientists; and Kevin Book, senior analyst and vice president, Friedman Billings Ramsey and Company, Incorporated.

I know, Senator Isakson, that you are interested in introducing Mr. Beasley and we appreciate your being here to do that. I'd call on you to introduce Mr. Beasley.

Senator ISAKSON. I thank you. I know the Chairman is interested in us moving expeditiously so I am not going to read what is a comprehensive and very complimentary resume, but I want to repeat what I said in my opening remarks. I don't know of anyone better equipped to testify at this hearing than Mr. Beasley.

Southern Nuclear, when they developed Plant Vogtle in Georgia, Mr. Beasley oversaw construction, Mr. Beasley oversaw startup, Mr. Beasley was in management on the operation of that plant, so all three critical phases. I think his testimony will be of tremendous help to us.

He is a graduate of my alma mater at the University of Georgia. He is a resident of the State of Alabama. He works for a group company that provides electric energy throughout the southeastern United States. I am delighted he is here today to join us.

Senator VOINOVICH. Thank you, Senator Isakson.

Mr. Beasley, we will start with you. As I said, we are limited to 5 minutes. I am going to be very strict on it. Then we will hopefully have an opportunity to have you answer some questions.

STATEMENT OF J. BARNIE BEASLEY, JR., PRESIDENT AND CEO, SOUTHERN NUCLEAR COMPANY

Mr. BEASLEY. Thank you, Mr. Chairman, and thank you, Senator Isakson.

I have entered written testimony into the record.

At the outset I want to personally thank you, Mr. Chairman, and the rest of the committee for your leadership in the nuclear provisions that were provided in the Energy Policy Act of 2005. We ap-

preciate the seriousness with which you take the oversight role, as demonstrated by this hearing.

The viability of the nuclear power industry, as we all know, depends on public confidence in the safety of nuclear powerplant operations and in the NRC's effective oversight of our current fleet and units. The NRC's revised reactor oversight process implemented in 2000 has resulted in a more efficient use of Commission and licensee resources and has improved safety by increasing the focus on objective, safety-significant indicators of performance. While the improvements that have been achieved in these areas are impressive, continued progress is needed in a number of areas. I have talked about that in my testimony.

We would also encourage the NRC to make more expeditious use of the tools of risk analysis and operating experience to ensure that decisions are risk informed, performance based, and reflect a realistic conservatism.

Regulatory consistency and efficiency are also critical to the licensing and construction of a new fleet of nuclear powerplants. In order for the companies to commit the investment needed to construct these plants, the economic risks will need to be comparable to other forms of baseload generation.

We believe that the licensing process contained in Part 52 of the NRC's regulations is capable of providing a regulatory environment in which plants can be licensed safely and efficiently, but the proposed revisions of Part 52 that have been talked about previously do cause us some concern, as the previous conversations have discussed.

Progress in resolving the issue of the disposal of used nuclear fuel is also important to the development of new plants. Nuclear generators and their customers have paid billions of dollars into the nuclear waste fund, and over $590 million has been paid in on behalf of the two plants in Georgia and almost $300 million paid in on behalf of Alabama Power's Plant Farley.

Finally, in order to bring plants online on schedule that matches the growing demand for the new baseload generation, it is essential that the DOE's nuclear power 2010 program continue to be funded and appropriate of the Federal share of the funding for one-time design finalization and COL development cost is a fundamental basis for the renewal of interest in new plant development.

In summary, Mr. Chairman, we appreciate the opportunity to be here and we will entertain questions.

Senator VOINOVICH. Thank you, Mr. Beasley.

Mr. Lochbaum.

STATEMENT OF DAVID A. LOCHBAUM, NUCLEAR SAFETY ENGINEER, UNION OF CONCERNED SCIENTISTS

Mr. LOCHBAUM. Mr. Chairman and members of the subcommittee, on behalf of the Union of Concerned Scientists, I thank you for this opportunity to present our views on the regulatory oversight program. In a prior hearing Chairman Voinovich impressed upon the NRC the need to better assess safety culture at nuclear plants. The NRC got this message and met with its stakeholders to develop a regulatory approach that will be implemented

in the near future. I participated in the meetings and believe the revisions will be effective.

Chairman Voinovich and the subcommittee deserve credit for calling the attention to the safety culture gap. Likewise, the NRC deserves credit for avoiding the temptation of merely applying band-aid fixes and instead devoting the resources needed for a long-term fix.

The safety culture gap had significant safety and economic consequences. The March 2002, discovery of serious degradation to the reactor vessel head at Davis-Besse has been attributed to its owner placing production ahead of safety. Ten years ago, the Millstone reactors began long outages to restore margins caused by an improper safety focus. Nearly 20 years ago, the Peach Bottom reactors began long outages to restore margins also caused by an improper safety focus.

While no one died in any one of these events, operation of the reactors in the years and months prior to the discovery of the extensive safety impairments exposed nearby communities to unnecessarily elevated risk. In addition, allowing the safety impairments to grow to epidemic proportions resulted in unnecessarily high restoration costs to ratepayers and stockholders.

The NRC's proposed revisions have very great potential, but even if that potential is fully realized, future safety impairments will likely continue unless two other steps are taken. One step expands the scope of the NRC's generic communications program to include safety culture problems.

The NRC uses regulatory issue summaries, information notices, generic letters and bulletins to warn plant owners about safety problems experienced here and abroad. Owners incorporate lessons learned from these generic communications into their training programs and plant procedures. The NRC has issued literally thousands of generic communications over the past four decades. Almost none of these have dealt with safety culture problems.

The NRC must issue generic communications when safety culture problems are identified so that other plant owners can incorporate applicable lessons into their training programs and procedures like they do for equipment-related problems.

The other step the NRC needs to take requires more effort. I recently assessed the times when nuclear reactors had to shut down for at least a year to restore safety levels. More than 70 percent of the causes of these year-plus outages were attributed to quality assurance program breakdowns. The NRC's regulations require plant owners to find and fix problems in a timely manner, but time and again those quality assurance programs utterly failed and the NRC did not detect the breakdowns until the shear volume of problems eroded safety levels to the point that it required more than a year to restore them. Davis-Besse illustrated that problem.

The NRC, in March 2001, evaluated the quality assurance program at Davis-Besse and concluded that it was fully adequate. Less than a year later significant problems were identified. The NRC's determination in 2001 was completely wrong and it had been wrong for several years prior to that.

The very first item on the NRC's restart checklist for Davis-Besse was to fix the corrective action program. The NRC's process

for enforcing quality assurance program regulations remains ineffective today. The recurring tritium spills at Braidwood and the recurring steam dryer damage at Quad City share a common cause: inadequate quality assurance.

The NRC must consistently and effectively enforce its quality assurance regulations to avoid chronic erosions of safety levels. I am confident that the NRC can rise to this challenge.

The other year-plus outages that have occurred in the past have been due to events like the Browns Ferry fire and the meltdown at Fermi were damage to large components like steam generators and recirculation piping. The NRC, through its efforts have almost completely eliminated those causes. There hasn't been an outage due to one of those causes in over 11 years. In that same time, there have been 11 year-plus outages due to quality assurance program breakdowns. I think if the NRC were to apply the same rigor to quality assurance program enforcement, it would achieve the same success in stopping that problem from occurring.

I have not been monitoring the new reactor process much so I can't provide much commentary on that other than to point out that the NRC is looking at what security features should be built into new reactor designs, and that issue is still on the table. That makes it difficult for new plant owners to make that decision about whether to build a plant or not when there is uncertainty about what the security provisions in the design needs to be. The NRC needs to get that in the rear-view mirror.

Thank you.

Senator VOINOVICH. Thank you, Mr. Lochbaum.

Mr. Book.

STATEMENT OF KEVIN BOOK, SENIOR ANALYST AND VICE PRESIDENT, FRIEDMAN BILLINGS RAMSEY & COMPANY, INC.

Mr. BOOK. Thank you, Chairman Voinovich, members of the subcommittee. The views I will express here today are my own and do not represent the viewpoint of Friedman Billings Ramsey and Company. I have submitted written testimony for the record, so I will summarize it to be brief.

Let me offer my admiration for the members of this subcommittee and the foregoing panel of Nuclear Regulatory Commission Commissioners because oversight of this Nation's nuclear power industry requires an impressive breadth of financial, legal, and technological knowledge.

My task, simply put, is that I analyze the busy people here in Washington for the busy people on Wall Street. I look at what energy policy actions taken here will do for listed securities and for the financial markets. I offer my assessment today turning things around the other way: what institutional investors' attitudes may be toward the current nuclear regulatory environment.

First, financial investors seek returns that outperform industry benchmarks. Whatever the criteria, timeframe, or style involved, investors generally seek to allocate the capital entrusted to their care to the highest-yielding investments among competing alternatives. Asset managers and corporate executives face essentially similar challenges when considering energy investments. Energy investments are risky by their nature. They usually take years of

development, and once the investment decision is taken there can be years still before cash-flows begin.

The debt and equity markets incorporate a measure of these risks inherent to any individual utility or energy firm that might undertake a new nuclear power facility into that firm's weighted average cost of capital. Taking into account both the rate of return the firm must offer its debt-holders and also the cost of that firm of issuing new equity.

From the investors' point of view, riskier investments must pay higher returns to be worth considering alongside less-risky investments. In the end, investors do not refuse to purchase riskier securities; rather, the aggregated capital markets demand higher returns to mitigate the effects of the higher associated risks.

Second, using EIA projections of electricity demand growth through 2025 of 1.5 percent per annum, and has been discussed much today, it is clear that new powerplant construction using nuclear technologies will be necessary to retain at least a proportional role for nuclear power in the Nation's future power needs.

Third, it has been mentioned today that the Energy Policy Act of 2005 created several meaningful incentives for new plant construction, including reauthorization of the Price Anderson Act, Federal loan guarantees, standby support to offset certain delays, and a 1.8 cent per kilowatt hour production tax credit. Also, due to the laudable work of the people in this room and their predecessors, the 1992 Energy Policy Act overhauled the licensing process to create a combined construction and operating license, among many other market advances.

Using EIA's projected capital costs of $2,000 per kilowatt, a 1 megawatt new nuclear powerplant would be a $2 billion undertaking and require project sponsors to source capital from the debt and equity markets. Irrespective of capital structure, it may not become clear until after advanced nuclear plant applications have been formally submitted and the capital raising process has begun whether incentives will be enough to generate investor enthusiasm in financial terms that meet the constraints of the project sponsors. Therefore, I would offer the view that there are two issues outstanding that could potentially result in investors assigning greater risk premiums to new offerings in support of reactor construction.

The first of these is the potential for delay. Many discounted cash-flow analyses of project or securities valuation, time is critical, dollar next year is worth less than a dollar today. Project delays, even at a low cost of capital, diminish cash on cash return and the effect is not just limited to cash-flows to the equity shareholders. Execution risk and delays in tandem with significant leverage can erode a project sponsor's creditworthiness, as well. Because new reactors will provide the first test of the combined construction and operating license process, investors are likely to consider the prospect that an unexpectedly long delay might outstrip even money allocated for standby support, particularly reactors three through six and seven and thereafter.

The secondary outstanding is waste storage. Unanticipated additional capital expenditures by project sponsors to construct waste storage could also negatively affect project returns. While Yucca Mountain operations can conceivably begin before the new nuclear

reactors even go into operation, investors must also consider that the prospect of federally provided permanent geological disposal of nuclear waste may not become operational at Yucca Mountain or anywhere else in the near term, intermediate, or even at all.

In closing, it is my view that the capital markets will most efficiently support the policy goal of expanding low emissions high capacity electricity generation through the construction of new nuclear powerplants when institution investors face minimum risks associated with regulatory delay and waste storage costs.

That concludes my prepared testimony.

Senator VOINOVICH. Thank you very much.

Mr. Beasley, what input—and if you don't have the answer, then tell me—has industry had in the new application that is being put together for these 18 proposed new nuclear power facilities?

Mr. BEASLEY. Mr. Chairman, I assume you are talking about the Part 52 changes that were discussed earlier?

Senator VOINOVICH. Right. I hark back to my days when I was Governor and one of the things that I found in some of our regulatory agencies is that the customers never really had a chance to look at the applications that they were supposed to fill out, and as part of our total quality program we got into that. Because of the fact that we talked with the customers and got an understand and we did the applications, things moved along a lot smoother because of the fact that everybody understood what the application meant, and some of the problems that we were experiencing in the past about not enough information included and the rest of it, those things went away because we worked together to redo those applications.

Mr. BEASLEY. Through our trade organization at Nuclear Energy Institute, we, as an industry, are very united in working with the NRC through the comment process, and we have provided them substantial input into the proposed rulemaking for the Part 52 changes. Obviously, as we continue through this period, we want to continue to have a dialog with them and continue to work with them to hopefully reach the solutions and conclusions that we would like to see in this rulemaking.

Senator VOINOVICH. Do you feel that there has been a responsiveness to the suggestions that have been made by NEI?

Mr. BEASLEY. I think it is a little premature. We have given those comments to the NRC and we now need to see how they are going to deal with those comments. We will continue to work with them so that they understand our comments.

Senator VOINOVICH. When are they supposed to come out with the final Part 52?

Mr. BEASLEY. I believe the final rulemaking is due out at the end of the year around the December timeframe.

Senator VOINOVICH. OK. When do you think that, say, your company would be ready? What is your vision? In other words, you are going to make an application. What do you anticipate in terms of the process?

Mr. BEASLEY. Well, we are going to make an early site permit application in August of this year, and then we will follow that up with a COL application in the early part of 2008. We are already working on both of those efforts, and we anticipate that, in working

with the NRC, that we can finalize some of these issues so that our efforts to prepare these applications can go forward very efficiently.

Senator VOINOVICH. One of the issues I raised with Mr. Diaz was the issue of all of the other organizations that have to sign off on one of these applications. A couple of the Commissioners mentioned the State situation. What are your thoughts on how the Commission might expedite the States' involvement in doing the things they need to do to move along expeditiously?

Mr. BEASLEY. Well, I will take a little different angle at that question. Again, this relates a little bit to the NRC, but the biggest thing that we are doing in the States through our operating companies is we have to, as a vertically integrated utility, have to get the certification to build and to rate base these plans, so we will be working in our States, particularly in the State of Georgia for the Vogtle application, we will be working with the State Public Service Commission to get that certification.

I am sure that there will be some questions related to the process. There will particularly be questions related to the spent nuclear fuel issue that we will have to deal with and work through at the State level.

Senator VOINOVICH. Would a letter from the Commission to the Governor of the respective State where the applicant resides and where the facilities are being proposed about the importance of the State moving ahead and looking at this and so on and so forth be helpful, do you believe?

Mr. BEASLEY. I believe it would. I believe close collaboration between those entities would certainly be good for the process.

Senator VOINOVICH. That might be something that we consider, because I know when I was Governor we had a lot of things on our plate, and if we are really interested in moving forward with more nuclear power in this country it seems to me that perhaps we ought to bring it to the attention of the Governors of those States so they can ignite some of their agencies to get moving on it and not just put it on the back burner.

Mr. BEASLEY. We have a very strong working relationship with our States and locals, and we are already doing a lot of up-front work, particularly, related to things like emergency planning and such, so a lot of that is already going on and we are pleased with what we see so far.

Senator VOINOVICH. Is there kind of a list of things that the States have to do that are kind of generic?

Mr. BEASLEY. I am not sure if there is a list, a specific list. I am not sure about that.

Senator VOINOVICH. It might be good to generate one and to kind of make it as comprehensive as possible so that people know just exactly the things that need to be taken care of.

Mr. BEASLEY. As we go through this process we will be making sure that kind of information is communicated. Yes, sir.

Senator VOINOVICH. Senator Isakson.

Senator ISAKSON. I will be brief because I know we have a call for a vote and we have about 10 minutes left to vote, so I will just make one quick comment and question.

I would call everybody's attention to Mr. Beasley's testimony and his phrase "the concept of finality and the need for the Commission

to understand in any proposed changes to 52 the absolute dependence on the concept of finality." Then I would refer everybody to Mr. Book's enlightened testimony regarding the cost of capital and what regulatory uncertainty can do.

He can correct me if I am wrong, but I refer to bonds of 1970s and 1980s, but at that time, while it is hard to believe now with the interest rate climb that we are in, I think the last of those bonds were tax free 15.3 or 15.4 percent bonds. If you get a protracted period of construction time and paying 15.3 percent on debt, you are talking about literally destroying the wisdom of any financial investment.

I hope the Commission will embrace the concept of finality and I hope everybody will read Mr. Book's full testimony, because his two concerns on storage of spent fuels and timeliness of regulation are absolutely critical.

With that I guess we need to vote, Mr. Chairman.

Senator VOINOVICH. If you want to ask another one, go ahead.

Senator ISAKSON. I am fine. Thank you, sir. I appreciate them coming.

Senator VOINOVICH. Thank you, Senator Isakson.

Several years ago, Mr. Book, we had another hearing in regard to new nuclear powerplants, and I recall the testimony of the witness from one of the investment firms on Wall Street that the issue of what was going to happen to nuclear waste had a major impact on their decisionmaking in terms of financing these new facilities. It seems that that does not seem to be as important today, and I still have not had it explained to me, but how important is that? And if you compare that with what you mentioned, delays in the application process, what would be the more dominant factor in considering going forward and investing in one of these new facilities?

Mr. BOOK. First and foremost, I would frame the decision against what else you could be investing in, because Wall Street investors can choose which bonds they want to buy.

Senator VOINOVICH. By the way, you are going to have lots of choices out there, because we have incented a lot of stuff out there.

Mr. BOOK. That is certainly true.

Senator VOINOVICH. More refineries for ethanol and——

Mr. BOOK. It is quit a list in the advanced technology title. Yes. It is a great list, and I think investors are going to look at the thing that returns the highest rate of return and they are going to ask, "If I have to choose between something I know about and something I don't, I am going to probably go with the one I know."

So it is not a question of which one of the two effects necessarily is greater, because either one of them can subvert the attractiveness of an investment in a new plant. That said, a delay making just some basic cost of capital assumptions giving very favorable bond ratings of even 2 years without the standby support, for example, if your reactor No. 7 could fundamentally bring the profitability based on just a back-of-an-envelope projection, to the point where you, the company, might have concerns about doing it, but the equity investor would certainly start to have difficulty. The delay of 5 years has a significant magnitude even with very generous up-front assumptions.

If you interject an additional waste storage cost at year six equivalent to the $200 million, for example, that was cited in a recent newspaper article about PG&E's Diablo Canyon potential cost, then you have something that also, in tandem with even a short delay, would subvert the attractiveness of the investment.

These two things working together can do a lot to make it still potentially, especially with a lot of incentives, a good investment, but not as good as an investment you might make in something else entirely.

Senator VOINOVICH. So the options, more uncertainty, you are going to have to pay a lot more for your money. I suspect that the first ones out of the gate are probably going to pay a little bit more until some folks can sit back and determine whether or not it is going to work.

I do think there are some incentives to speed up that first group, so maybe that will counteract the uncertainty, will take a look at the risk maybe just a little bit less because of that.

Well, that is one issue that we are really going to have to deal with. Maybe we will get that from the Commission about the issue of storage, of where you are going to put it. I have talked to some of the industry people and I still have not had a really good explanation. Some of them are talking about they can keep it onsite and they are talking about what they are doing in Europe. Apparently, they keep it onsite and that is the cost of that, but ultimately they have to have somewhere where they can put it. I am interested in more information on that.

Mr. Lochbaum, in your testimony you talked about the fact that you were not sure that the application process was dealing forthrightly with the issue of security. Would you want to comment on that for me?

Mr. LOCHBAUM. It is on the NRC's plate. It is something they are going to get to this year, but more than close to 5 years after 9/11 that is really something that should be in the rear-view mirror instead of on the road ahead, because the indecision about what those security measures might be or might not be makes it harder for plant owners to make a final decision about whether to proceed or not to proceed, just from a business standpoint.

Senator VOINOVICH. Are you familiar at all with the security measures that have already been put in at the current facilities? I am sure you are somewhat familiar with that. Would you anticipate that in the construction of the new facilities that there would be added security measures, or as the alternative that when you are building it you build it more to secure it so you limit the cost that you have now because you didn't build it with the idea that you had to secure it against terrorists?

Mr. LOCHBAUM. It is more of the latter. At the NRC's Regulatory Information Conference in March of this year, the NRC staff indicated that they are going to look at what features need to be built in on the front end to make the designs more robust or less vulnerable to terrorist action, and that process is taking place this year with a decision made later this year or early next year, but that is the process about what features will be required for new reactor designs.

Senator VOINOVICH. Do you anticipate it is going to be more security than what is currently being done?

Mr. LOCHBAUM. The way it was characterized, yes. It is things that would be in addition to what is in place for existing reactors.

Senator VOINOVICH. Do any of you have any other comments you want to make?

[No response.]

Senator VOINOVICH. I have to run and vote. I apologize that we don't have more folks here to ask you questions. Again, if you don't mind, we are going to submit some questions for the record and if you can get back to us in writing we would be very grateful.

Senator VOINOVICH. Thank you very much for being here today.

Mr. LOCHBAUM. Thanks for having us.

Mr. BOOK. Thank you, sir.

Mr. BEASLEY. Thank you, Mr. Chairman.

Senator VOINOVICH. The meeting is adjourned.

[Whereupon, at 11:21 a.m., the subcommittee was adjourned.]

[Additional statements submitted for the record follow:]

STATEMENT OF NILS J. DIAZ, CHAIRMAN, NUCLEAR REGULATORY COMMISSION

Mr. Chairman and Members of the Committee, it is a pleasure to appear before you today to discuss the Nuclear Regulatory Commission's progress on implementing the provisions of the Energy Policy Act of 2005 (the Act), programs for new reactor regulation, and the current state of the Reactor Oversight Process (ROP). We appreciate the support that we have received from the Committee on these matters. On a personal note, Mr. Chairman, I am grateful for the opportunity to serve this great country of ours for almost 10 years, first as a Commissioner and then as Chairman of the best nuclear regulatory agency in the world. It has been my privilege to have worked with you during extraordinary times, to better serve the well-being of this Nation.

The NRC is dedicated to the mission mandated by Congress—to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment—in the application of nuclear technology for civilian use. We are committed to exercise this mandate with a regulatory framework that is effective, predictable, and that continues to meet the changing demands of the country. To achieve this goal, we have made preparations and continue to put in place the infrastructure needed to conduct all the activities needed for the announced new reactor licensing and design certification work, including the 17 expected combined operating license (COL) applications beginning in 2007. We would like to highlight our current and anticipated new reactor regulatory activities, a new system for licensing reviews, and new human capital and space planning initiatives designed to meet the new challenges posed by the dynamic nature of today's nuclear arena, which include the effects of the Act. The NRC has continued to make significant progress implementing the provisions of the Act, and we would like to discuss them. In addition, we would like to share where we are today and the improvements we have made and continue to make to the ROP. The continued safe and secure operation of the current fleet of operating nuclear powerplants remains the Agency's top priority; therefore, the new activities are being carefully planned to ensure the continued safe operation of these facilities.

ENERGY POLICY ACT OF 2005

Since we last spoke to you in March, the Commission has completed additional actions to implement provisions of the Energy Policy Act of 2005. To date we have completed the following significant milestones:

- Final rule to implement revised Price-Anderson Act and eliminate NRC antitrust reviews;
- Final rule on import/export controls;
- Proposed rule on Design Basis Threat;
- Confirmatory Order for emergency notification system backup power at Indian Point;
- Final rule on National Source Tracking System;

• Grant awarded to National Academy of Sciences for a study of industrial, research, and commercial uses of radiation sources;

• Draft proposed rule broadening the definition of byproduct material submitted to the Commission; and

• Draft proposed rule for protection of safeguards information submitted to the Commission.

To prepare for the next generation nuclear plant (NGNP) project, the Commission has begun working with the Department of Energy (DOE) to define the responsibilities of each agency and how NRC resources will be reimbursed. These cooperative interactions and the reimbursement process will be incorporated in a Memorandum of Understanding (MOU), consistent with the Act, that is being developed.

As discussed above, many actions and key milestones relevant to provisions contained in the Act have been completed and many more are on schedule to be completed over the next several years. However, a few of the milestones in the Act will be challenging, and difficult to meet on schedule, although we are making, and have made, every effort to meet them.

As I previously described in a letter to the subcommittee dated June 15, 2006, one that is particularly challenging is related to Section 656 of the Act, "Secure Transfer of Materials." This section of the Act requires the Commission to establish a system such that all non-exempt byproduct material, source material, special nuclear material, high-level radioactive waste, spent nuclear fuel, transuranic waste, and low-level radioactive waste, when transferred or received in the United States by a party pursuant to an import or export license issued by the NRC, are accompanied by a manifest describing the type and amount of materials being transferred or received. This section requires that each individual receiving or accompanying the transfer of such material be subject to a security background check conducted by an appropriate Federal entity. The NRC has focused most of it efforts on this second requirement since it can rely on the Department of Transportation's manifest requirements to address the first requirement. This section also directs the Commission to issue regulations within one year of the Act, identifying radioactive materials or classes of individuals to be given exceptions to these requirements. The staff has been coordinating its rulemaking activities with other Federal agencies, the States, and other stakeholders and continues to work on resolving several significant issues associated with implementation of the requirement. We discussed this provision at a recent Commission meeting in which the States and other stakeholders, particularly from the medical community, participated. As a result, the NRC will not meet the August 2006 date for issuing a final rule, but anticipates issuing a final rule before the end of this year.

The issues that require resolution prior to issuing the proposed rule for comment are as follows:

• Coordination with other Federal agencies responsible for transportation security and background checks;

• Coordination with States over the regulatory basis and rule language;

• Defining the classes of individuals subject to background checks; and

• Defining acceptance criteria for background checks.

The other action that may potentially be challenging is implementation of Section 651(d)(1), "Radiation Source Protection, National Academy of Sciences [NAS] Study." This action required the Commission to enter into an arrangement with the NAS within 60 days to conduct a study of industrial, research, and commercial uses for radiation sources, as defined in the Act. The Act defines radiation sources as Category 2 and above controlled under the 2002 IAEA Code of Conduct on Safety and Security of Radiation Sources. The study must identify if there are other processes which either can replace Category 1 and 2 sources with economically and technically appropriate alternatives, or can use Category 1 and 2 sources that pose a lower risk to the public. The NRC is required to submit the results of the study to Congress by August 7, 2007. On January 11, 2006, the staff awarded a grant to NAS and on February 15, 2006, held an initial meeting with NAS for conduct of the study. However, NAS has not yet begun work on this study. The staff has requested a draft report from NAS by spring 2007 in order to meet the August 2007 due date, but it appears that NAS may not have a draft report available at that time.

Several provisions of the Act relate to the export or import of Atomic Energy Act material and equipment. On April 20, 2006, the NRC issued a final rule to, among other things, revise the regulations regarding the export of HEU for medical isotope production, and add radium-226 to our export and import regulations.

NEW PLANT APPLICATIONS

As a result of the passage of the Energy Policy Act of 2005 and concurrent developments in U.S. energy demands, the NRC is preparing for an increased number of potential early site permit (ESP), design certification (DC), and COL applications. The Energy Policy Act incentives for new reactor construction established an environment in which new nuclear powerplants are being seriously considered to meet future generation capacity, the need for which is expected to increase by the year 2015. Last year at this time, the NRC had been notified of three potential COL applications in the next few years. Today, the number of expected COL applications is 17 for up to 25 units, and the number of applications is expected to increase in the future. Some of these applications are expected to reference reactor designs already certified by the NRC, such as the Westinghouse AP1000 and General Electric's Advanced Boiling Water Reactor (ABWR), while others are expected to reference designs that are currently under NRC review, such as the General Electric Economic Simplified Boiling Water Reactor (ESBWR) and AREVA's U.S. Evolutionary Power Reactor (EPR) which is at the pre-application stage. We also expect to conduct reviews of additional ESP applications. We are preparing to review and act on the many applications anticipated to be submitted in the 2007–2008 time frame, and are organizing accordingly. We continue to assess our resource needs, which have increased significantly, in light of the very substantial increase in the number of anticipated COL applications and related work. The attached graphs show the anticipated work schedule based on industry submittals, public announcements, and expected, but as yet unannounced applications, separated by reactor design.

PREPARING FOR THE FUTURE

We are undertaking major initiatives to ensure that NRC is ready to process the new reactor applications inspired by the Energy Policy Act. We are:

- Developing guidance on preparation and review of COL applications to help ensure high quality applications from industry and to streamline staff review.
- Revising Part 52 to make our review and licensing processes more effective and efficient.
- Revising our Part 73 security regulations in three separate rulemakings to provide clear and stable security regulations to new applicants.
- Creating a Design-Centered-Approach to facilitate effective, efficient, and timely reviews of multiple COL applications. This approach is founded on the concept of "one issue—one review—one position, for multiple applications" to optimize the review effort and resources needed to perform the reviews.
- Developing a new construction inspection program to prepare for the construction phase of new reactors. This new program will build on the lessons learned from the construction of the existing fleet of new reactors.
- Optimizing our human capital to prepare for an increased workload while accounting for possible increased attrition.
- Enhancing our office space and infrastructure by working with the General Services Administration to acquire additional office space as close as possible to NRC Headquarters.
- Developing a Multi-National Design Approval Program with international regulators to leverage world-wide nuclear safety, licensing, and operating experience.

CURRENT NEW REACTOR LICENSING ACTIVITIES

NRC's licensing reviews are supported by regulatory guides and standard review plan (SRP). The NRC staff is reviewing and revising the regulatory guidance documents associated with new reactor licensing. These guidance documents include a planned COL application regulatory guide which contains the information that COL applicants need to provide in their applications, and an update of pertinent SRPs for use by NRC staff reviewing COL applications. A draft regulatory guide, which has been the subject of numerous public meetings and workshops, will be published for comment in July 2006. The NRC staff expects to issue the final regulatory guide by December 2006. This will support prospective applicants who are planning to submit COL applications in late 2007 and 2008. This schedule is consistent with the schedule for the promulgation of the revised Part 52 rule. The NRC staff is also updating SRPs and regulatory guides that are important to support the anticipated new site and reactor licensing applications. This work is being conducted in a manner that complements the COL regulatory guide. The staff intends to complete the high priority SRP and regulatory guide updates by the spring of 2007.

The Agency's work on new reactor standardized design certification has also intensified. Three designs were previously certified: General Electric's ABWR, Wes-

tinghouse's AP600, and Combustion Engineering's System 80+ designs. The NRC recently certified the Westinghouse AP1000 reactor and codified it in the NRC's regulations, as Appendix D to 10 CFR Part 52. The NRC is currently reviewing the General Electric ESBWR design certification application and is on schedule with respect to its review. The NRC is conducting pre-application activities for AREVA's U.S. EPR design. This design certification application is expected in 2007. The NRC is also conducting very limited pre-application work for the Pebble Bed Modular Reactor (PBMR) and the Westinghouse International Reactor Innovative and Secure (IRIS), and is expecting additional design certification applications in the future.

To effectively review multiple COL applications in parallel, the staff is planning to implement a design-centered review approach. We believe this approach is crucial to achieving effective, efficient, and timely reviews for multiple applications. This approach is founded on the concept of "one issue-one review-one position for multiple applications" to optimize the review effort and resources needed to perform these reviews. The NRC staff would use a single technical evaluation for each reactor design to support reviews of multiple COL applications for the same technical area of review, assuming that the relevant components of the applications are standardized. The design-centered approach will focus its reviews by: (1) using standardization and coordination of approaches and applications; (2) requiring complete and high quality applications; (3) increasing the use of the DC rulemaking to codify issue closure; and (4) using single technical evaluations to support multiple COL applications to the extent practicable. In addition, to achieve consistency among the staff reviews, the process for implementing the design-centered review program will require a multi-layered project management team for each design, and will use dedicated technical review resources. The plans and schedules of these reviews include an increased level of detail and integration to achieve the requisite level of control and documentation. The benefits of this approach would be enhanced by the full participation of multiple entities in ensuring that pertinent components of the applications are standardized to the extent practicable. A schematic representation of the sequencing and use of the design-centered review approach is shown in an attached graph. Significant efficiencies in the staff's drafting of its safety evaluation reports for each COL applicant are expected to be gained through the use of the design centered approach.

NEW REACTOR CONSTRUCTION OVERSIGHT

To prepare for the construction of new reactors licensed in accordance with 10 CFR Part 52, a new construction inspection program (CIP) is being developed. The new CIP builds on the lessons learned from the construction of the existing fleet of operating reactors. The CIP comprises four different parts: early site permit inspections; pre-combined license (pre-COL) inspections; inspections, tests, analyses and acceptance criteria (ITAAC) inspections after issuance of a COL; and non-ITAAC inspections. These inspections will cover all aspects of new plant construction and operation from early site preparation work through construction. They will also facilitate the transition to inspections under the reactor oversight process (ROP) for operating reactors. Associated inspection procedures for half of the program are in place and the remaining procedures are under development and are scheduled to be in place well before the start of approved on-site construction activities.

Successful implementation of the CIP will require four main functions: (1) day-to-day inspections at the construction site by resident construction inspectors; (2) on-site inspections by specialist inspectors; (3) off-site inspections (e.g., vendor inspections); and (4) documentation of inspection results and public notification of the successful completion of the ITAAC. ITAAC are part of the combined license and define specific requirements to be met prior to full-power operation. To gain staff efficiencies and facilitate knowledge transfer, all construction inspection management and resources will initially be located in a single region which will schedule all construction inspections nationwide.

The NRC performed an initial assessment of the existing ROP for use with new reactor designs which confirmed that the overall ROP framework could be used, including utilizing performance indicators and the significance determination process for evaluating inspection findings. The Construction Inspection Program will specifically address each new reactor to be built, detailing the steps that will be employed to integrate that plant into the ROP as it transitions from the construction phase into the startup and operations phase.

MULTINATIONAL DESIGN APPROVAL PROGRAM (MDAP)

The NRC is working with international regulators on a multinational design approval program intended to leverage world-wide nuclear safety, licensing and operating experience in a cooperative effort to review reactor designs that have been or are being reviewed and approved in other countries. Key goals of this cooperative effort are to improve safety with standard designs, and improve the effectiveness and efficiency of the regulatory reviews of new reactor designs. The first stage of the MDAP has already begun. It involves enhanced cooperation with the regulatory authorities in Finland and France to assist NRC's future design certification review of the US EPR. The anticipated cooperation under the first stage would include the sharing of pertinent regulatory information, the exchange of technical personnel consistent with the applicable laws of each country, participation in inspection activities, peer review activities, and other activities that would seek to leverage the safety expertise of each of the national regulatory bodies. Follow-on stages of the MDAP could foster the safety of reactors in participating nations through convergence on safety codes and standards, and other technical matters while maintaining full national sovereignty over regulatory decisions. Preliminary work to more fully develop the framework to expand and better define MDAP is underway at the NRC and the Organization for Economic Co-operation and Development's Nuclear Energy Agency.

CHALLENGES

The NRC recognizes that many challenges for new reactor licensing activities continue to exist. Key challenges include effective communication between the NRC and the applicants, and the interrelationship between the technical review and the associated adjudicatory process. To successfully complete the reviews within the anticipated schedule, continuous clear, effective, and timely communication between the NRC and the applicant must occur. Delays in providing or responding to requests for information must be avoided, and any modifications to the application need to be conveyed immediately so that reviews can be appropriately coordinated. In addition, the technical review and adjudicatory process for the application are interrelated and for ESPs and COLs both are required for the final decision making process. Multiple products are needed on schedule to maximize the early resolution of issues leading to a final determination, including issuance of an ESP, DC and/or COL. An applicant may decide to submit a license application in a manner different from the originally contemplated sequence, such as choosing not to apply for an ESP prior to applying for a COL. In such cases, the technical and environmental reviews and the adjudicatory review that would ordinarily be performed at the ESP stage will need to be included in the COL review and could challenge the application review schedule. To meet these challenges, we are implementing organizational changes in our legal and technical organizations, recruiting personnel, and developing an integrated planning tool to assist in coordinating the applicant schedules.

Some challenges to success are beyond NRC's control. A new contract for spent fuel needs to be agreed upon. The Department of Homeland Security must prepare for its responsibilities in emergency preparedness and security (as described in Section 657 of the Act) and budget resources for those roles. Industry must submit high-quality applications that address and eventually resolve issues over which State and local governments have a statutory role.

The NRC has completed substantial preparation activities and executed reviews of supporting elements for COL applications (e.g., ESPs and DCs). We continue to incorporate the lessons learned from past and current reviews to create a stable and predictable regulatory process. As such, the NRC is preparing to conduct thorough and timely reviews of COL applications and of inspections, tests, analyses and acceptance criteria (ITAAC). This should minimize the potential for dependence on the use of the Energy Policy Act Risk Insurance Program. As noted previously, when COL applications are submitted, they should be high quality, standardized applications that contain the safety analysis and other required components in the level of detail that will not just allow docketing, but also will allow the NRC to complete staff review and the adjudicatory process in a timely manner.

The NRC is cognizant and is prepared to discharge its responsibilities in new reactor licensing, the success of which depends on many factors, including the submittal of high quality applications by the industry. With the continued support of Congress, we will carry out our responsibilities and meet the challenges ahead.

HUMAN CAPITAL AND SPACE PLANNING

As you know, the NRC has been aggressively recruiting a mixture of recent college graduates and experienced professionals to meet the Agency's emergent work activities. As we told you in March, we expect that an additional 400 FTEs will be devoted to new reactor work by FY 2008. I am pleased to report that we have already exceeded our goal of hiring approximately 350 new employees in FY 2006. We are in the process of training our new recruits and we are seeking to improve our training programs. We are also putting very high priority on knowledge management, since we expect to lose about 200 employees per year for the next several years, including many of our most senior managers and professional staff. Our aggressive efforts to recruit, hire, and develop staff will continue throughout Fiscal Year 2007 as we prepare for receipt of the first COL applications.

To solve NRC's immediate need for additional office space, we requested that GSA expedite the acquisition of interim office space to enable NRC occupancy this fall. NRC's long-term space needs are more problematic. We are working with GSA to address our long-term space needs through the established portfolio acquisition process for Congressional approval. However, the established process will not result in occupancy of additional permanent space until FY 2009, at the earliest, which may deprive NRC of an opportunity to acquire space adjacent to our headquarters campus. Therefore, as noted in our letter to you dated April 5, 2006, the Committee's assistance in two specific areas would be of great value to the NRC: legislative authority for the General Services Administration (GSA) to immediately acquire space as close as possible to the NRC headquarters location and legislative relief to accelerate the space acquisition process.

With Congress' help, the Commission is poised to meet the challenge of maintaining adequate infrastructure and the personnel needed to accomplish its mission successfully. This will be accomplished through the ongoing human capital planning, implementation, and assessment process, the space planning program, and the various tools provided by the Energy Policy Act of 2005.

REACTOR OVERSIGHT PROCESS

The NRC first implemented the reactor oversight process (ROP) in April 2000 to provide a more disciplined and objective approach to the oversight of operating nuclear reactors. The ROP is a mostly risk-informed process that focuses inspections on those activities or areas that are risk significant (i.e., important to plant safety based on each plant's design) and that increases the level of scrutiny on elements of a licensee's performance that appear to be declining. The ROP requires that inspections be performed in seven fundamental areas to measure plant performance and maintain safe plant operation. For example, we recently undertook a substantial effort to strengthen its engineering inspection procedures to increase the scrutiny of operator actions and risk significant components. In addition to the component design bases inspection, the NRC dedicates a significant amount of the ROP baseline inspection to the evaluation of other plant activities such as evaluation of changes and tests, fire protection, plant modifications, and maintenance effectiveness, among others.

Over the past 6 years, the ROP has focused on stakeholder involvement and has matured into a more consistent, established risk-informed process. The Commission agrees with the feedback from both internal and external stakeholders that the ROP is a significant improvement over the previous, more subjective oversight process. The ROP continues to meet its established objectives and intended outcomes as demonstrated annually through its self-assessment process. The NRC appropriately monitors operating nuclear powerplant activities, focuses agency resources on significant performance issues, and maintains a level of oversight commensurate with licensee performance. The results of NRC oversight activities, including performance indicators, inspection findings, and the current assessment of overall performance for each reactor, are publicly available on the NRC's web site.

The NRC has made numerous improvements to the ROP since its initial implementation, including many as a result of independent program evaluations and feedback from internal and external stakeholders. The inspection program and associated resources have been adjusted to better focus on risk-significant issues, with significant enhancements in the areas of problem identification and resolution, fire protection, safety culture, design engineering, and in-service inspections. Many of these changes were based on lessons learned from the Davis-Besse event. The timeliness and consistency of determining inspection finding significance have notably improved over the past several years due to program enhancements and an increased management focus. The plant assessment process has been modified to further improve its predictability, particularly in the treatment of cross-cutting issues, old de-

sign issues, and plants with significant performance deficiencies. The staff and industry have developed and implemented a new performance indicator, the mitigating systems performance index (MSPI), to address known problems with the safety system unavailability indicators and to utilize important risk insights.

The MSPI combines safety component reliability and availability with plant-specific probabilistic risk assessment (PRA) information to arrive at a single performance index for each monitored system. Since the MSPI pilot ended in 2003, the staff finalized the technical guidance needed for implementing MSPI, defined and addressed a minimum level of PRA quality, and resolved issues identified throughout the development and review processes. At the beginning of April 2006, the staff implemented MSPI, and licensees are scheduled to submit their initial data sets in July 2006. The staff expects a number of changes to overall plant assessments due to MSPI implementation. The NRC has conducted training for our inspectors and plans to perform inspections at each site to verify the proper initial implementation of MSPI by the end of 2006.

Finally, the NRC is implementing safety culture initiatives to enhance the ROP. The NRC, with the participation of stakeholders, enhanced the ROP to better align the three cross-cutting areas to those aspects of performance that are important to safety culture. We have adjusted selected baseline, event response, and supplemental inspection procedures and inspection manual chapters. Computer-based training and training at regional counterpart meetings were provided. The NRC is incorporating appropriate aspects of safety culture into initial training for new inspectors and continuing training for existing inspectors. The modified ROP will be implemented by July 1.

CONCLUSION

The Commission is dedicated to ensuring that our agency is ready to meet the expected demand for new reactor licensing. NRC's Part 52 processes are safety focused and are efficient and predictable. We have taken action to clarify Part 52, to ensure a clear regulatory and oversight framework; to reorganize the Agency and put in place the processes to ensure timely review; to meet the NRC's human capital and office space needs, and to seek additional funding as necessary. The Agency is prepared to meet the challenge associated with new reactors while maintaining strong oversight of the current operating reactors. We are convinced that the Agency has the technical and legal know-how to make the right decisions in a timely manner.

We appreciate the opportunity to appear before you today, and the Commission looks forward to continuing to work with the committee. We welcome your comments and questions.

RESPONSES BY NILS J. DIAZ TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

Question 1. I was disappointed with the pessimistic views expressed by some of the Commissioners at the hearing regarding the agency's ability to meet its review schedule for new reactor licensing, after all the support that this Committee has provided to the Commission in terms of the needed legislation and funding for additional resources. I would like a commitment from the Commission to establish an effective and efficient review process that adheres to the established schedule. A stable and predictable licensing process is an absolute must if we are to proceed with constructing new nuclear powerplants in this country. If additional legislative support and/or funding for additional resources are needed in this regard, then I would expect the Commission to identify those to this Committee as soon as possible.

Response. The Commission is committed to implementing effective and efficient review processes that adhere to established schedules. The Commission's commitment is demonstrated through its efforts involving the ongoing 10 CFR Part 52 rulemaking, and development of a design centered application review approach. 10 CFR Part 52 establishes a more predictable licensing process as it provides for resolution of issues earlier in the licensing process. The design centered review approach will use, to the extent practicable, a "one issue-one review-one position" strategy in order to optimize the review effort and resources needed to perform these reviews; that is, the staff will conduct one technical review for each reactor design issue and use the results of this review to support the review of the design certification and each combined license application. The Commission is committed to completing these reviews on schedule and will not compromise on safety as it sets milestones and manages its activities to meet them. Submission of a high quality, standardized application should enable the NRC to meet its schedule.

Question 2. Mr. Diaz, can you expand the discussion on the impact of the Federal Government's continued delay in opening up a permanent repository for spent fuels at Yucca Mountain is for new reactor licensing? Are there any statutory or regulatory requirements that tie new reactor licensing to Yucca Mountain?

Response. The Commission has expressed confidence that spent fuel and high-level waste produced by nuclear facilities can be safely disposed of and safely stored until safe disposal is available. The NRC is prepared to review an application for a permanent repository from the Department of Energy when it is submitted.

In its 1990 Waste Confidence decision, the Commission concluded that spent nuclear fuel can be safely stored without significant environmental impact for at least 100 years, if necessary. Spent nuclear fuel is being managed safely today and the Commission has every expectation that it can be and will be managed safely in the future at least with the same level of protection in place today.

New reactor licensing relies on the Commission's Waste Confidence decision. New reactor licensing does not require that Yucca Mountain be opened on a particular schedule. However, in performing its environmental reviews, the NRC may need to make some reasonable assumptions regarding disposal of spent fuel and high-level waste. For this purpose, the staff believes it is reasonable to assume the Yucca Mountain location as a surrogate for performing analyses, for example, of transportation impacts.

Finally, in 1999, the Commission stated that it would consider undertaking a comprehensive reevaluation of the Waste Confidence findings if either of two criteria were met: (1) when the impending repository development and regulatory activities run their course; or (2) if significant and pertinent unexpected events occur, raising substantial doubt about the continuing validity of the Waste Confidence findings. Neither of these criteria have been met.

Question 3. In addition to the ongoing revision to the NRC's Part 52 rule, I understand that NRC is also revising its nuclear plant security regulations affecting new reactors. When do you expect to get this done? In the interim, what guidance would you give to the prospective applicants for new reactors regarding the plant security requirements? Do you anticipate the requirements for new reactors to be any different than the current requirements with all the enhancements since 9/11 for the existing reactors?

Response. The staff currently has several rules in different phases of the rulemaking process that will ultimately support new reactors. These include rules for the Design Basis Threat (DBT), Power Reactor Security Requirements, security assessments for new licensees, and security requirements for the construction and manufacture of new plants. Following the terrorist attacks of 9/11, the Commission issued orders to power reactor licensees enhancing the DBT as described in 10 CFR 73.1. The proposed rulemaking to amend 10 CFR 73.1, would revise the DBT requirements in 73.1 and redefine the level of security requirements necessary to ensure that the public health and safety and the common defense and security are adequately protected. The agency published the proposed rule for public comment in the Federal Register and is currently evaluating the comments that were received. A final rule is scheduled to be provided to the Commission for review in October 2006.

The proposed Power Reactor Security Requirements rule would make generically applicable the requirements contained in the remaining post 9/11 security orders based upon experience and insights gained by the Commission resulting from implementation of the orders. A final rule is expected to be provided to the Commission in October 2007. The staff is currently developing a new reactor security assessment rule which would require physical security assessments during the design of nuclear powerplants, so that design features to enhance security may be incorporated into the design at the appropriate stage. A proposed rule is scheduled to be provided to the Commission for its consideration in September 2006 and a final rule is scheduled to be provided to the Commission in September 2007.

The staff is considering a rulemaking and has held meetings with stakeholders regarding the security requirements for construction and manufacture of new nuclear power reactors and plants. This rule is on an expedited schedule. A proposed rule is expected to be made available to stakeholders in December 2006 and is scheduled to be provided to the Commission in December 2007. Based on these time lines, all required information is scheduled to be available to stakeholders at least in the form of a proposed rule before January 2007, with all rules scheduled to become final by January 2008. In the interim, the staff is encouraging prospective applicants to stay engaged in the rulemaking process and is making efforts to release draft documents as expeditiously as possible.

The Commission intends for the security requirements to remain consistent for both new and existing nuclear reactors. However, if the Commission adopts a final rule on security design assessments, designers of new nuclear power reactors would effectively be required to utilize design features to address security, which will represent a shift from the current reliance on active ("programmatic") security measures.

Question 4. In response to one of the questions during the last oversight hearing, NRC stated that it will need additional appropriation of $40 million for FY 2007 for the new reactor licensing program. I will support this request for the additional appropriation. But, NRC will need to do a better job of developing its budget going forward. Notwithstanding the current dynamic situation in the new reactor licensing arena, coming in for additional funding 2 years in a row doesn't exactly foster a high level of confidence that the NRC has its act together to manage this highly visible program. Mr. Diaz, can you talk a little bit about how the Commission might be able to do better in this area?

Response. The Commission appreciates your support for the additional funding of its rapidly expanding workload related to new reactor license applications. The Commission understands and shares the frustration with the dynamic nature of the agency's budgetary needs that has resulted from the success of the President's Energy Policy and the enactment of the Energy Policy Act of 2005 by Congress.

The NRC closely monitors industry's interest in new reactors, and bases its workload forecast on correspondence from the industry. We typically budget for that workload which has a reasonable level of certainty to occur, and the enactment of the Energy Policy Act has made forecasting such workload very challenging. We will revisit our approach for forecasting future work in this area to minimize the potential for recurrence.

By way of background, subsequent to the development of the NRC's FY 2007 budget, the nuclear industry indicated that its demand for new reactor licensing would grow more rapidly than previously assumed. The NRC's FY 2007 budget request included increased funding based on four combined construction and operating license applications; one in FY 2007 and three in FY 2008. In the past several months, 11 separate companies have announced plans to submit 17 combined license applications for new nuclear power reactors; 2 in FY 2007, 14 in FY 2008 and 1 in FY 2009. Two additional companies have also indicated that they expect to each submit a combined license application in this time frame. Thus, a total of 19 combined license applications are now expected to be submitted over the next 3 years. Note that this number has increased since we testified before the Committee on June 22 because we have received an additional letter of intent to submit a COL from the industry.

RESPONSES BY NILS J. DIAZ TO ADDITIONAL QUESTIONS FROM SENATOR JEFFORDS

Question 1. NRC is working hard to implement the nuclear provisions of the Energy Policy Act of 2005. While you have made important strides, the examples you give in your testimony of where you will miss the law's deadlines are troubling. New regulations on the import and export of nuclear materials and a National Academy of Sciences study on alternatives to Category I and II Source are very important. Is there anything the Committee can do to ensure that the new deadlines you announced in your testimony are met?

Response. Regarding the NRC's rulemaking efforts to implement Section 656 of the Energy Policy Act of 2005 (EPAct) on "Secure Transfer of Nuclear Materials," the NRC is confident that the current schedule, which calls for publishing a proposed rule in the summer of 2006 and issuing a final rule before the end of calendar year 2006 will be met. The staff has considered input from other agencies and from the Agreement States, and a rulemaking package is now with the Commission for review.

While this rulemaking effort is in progress, the Commission believes that the public health and safety and the common defense and security are adequately protected by the system of Orders that NRC has issued to higher risk licensees imposing additional measures for securing licensed materials from unauthorized removal or access, as well as provisions of other Federal Agencies for transfer and transportation of material.

Regarding the deadlines for the National Academy of Sciences (NAS) study on alternative sources, the NRC has no specific recommendations for the Committee at this time. The schedule for the study will remain under the control of the NAS. The NRC has committed staff resources to fully assist NAS in this effort.

Question 2. The public is able to obtain NRC documents issued prior to 1999 from local public document rooms, usually housed in local libraries. The NRC made a decision not to be the supplier of these older documents, but to put newer documents on the Internet. Has the NRC realized any cost savings by not providing these older documents on the Internet? What would be the cost to make these materials available electronically?

Response. On April 1, 2000, the Agencywide Documents Access and Management System (ADAMS) became NRC's official record keeping system. The Publicly Available Records System (PARS) library of ADAMS contains post April 1, 2000 documents and 145,377 pre-April 1, 2000 documents that are publicly available and accessible through a link on NRC's Public Web site. It is important to note that bibliographic citations for the NRC documents issued before 1999 are available to the public through the Internet using the Public Legacy Library. The bibliographic citations as well as copies of the documents are available from the NRC Public Document Room.

The full text of more than 1.8 million documents was not retrofitted into ADAMS/PARS. At the current document processing rate, NRC has avoided incurring costs in excess of $28 million to process these remaining 1.8 million documents into ADAMS/PARS. The $28 million figure includes contractor document processing costs only. The figure does not include NRC staff time or fees associated with retrieving/returning the documents from/to storage.

Question 3. In its April 2005 report, GAO recommended that NRC establish specific requirements for the control and accounting of loose fuel nuclear rods and rod fragments. What has NRC done to respond to this recommendation?

Response. The NRC believes that the regulations related to material control and accounting (MC&A) are clear and do not need revision. Further, under 10 CFR 74.19, each licensee is required to keep records of receipt, shipment, disposal, and inventory (including location) of all special nuclear material in its possession and to perform annual physical inventories of all special nuclear material. In this context, all special nuclear material includes irradiated nuclear fuel in all forms and includes rods and pieces.

NRC is revising the guidance and the American National Standards Institute (ANSI) standard for MC&A at power reactors. NRC has met with representatives of the Department of Energy, the power reactor industry, and the Nuclear Energy Institute to prepare a draft revision of the ANSI standard. NRC is continuing inspections of MC&A programs at power reactors and wet storage sites under Temporary Instruction (TI) 2515/154, "Spent Fuel Material Control and Accounting at Nuclear powerplants," and will use information gathered from these inspections to inform revisions to the guidance.

Question 4. The GAO report also recommended that the NRC establish specific requirements for the way plants conduct physical inventories of fuel rods and for the inspection of plants to verify their compliance. What has the NRC done on these issues?

Response. The NRC agreed with the GAO's recommendation concerning the inspection program and is conducting baseline inspections. Based on the results of the inspections conducted to date, NRC plans to conduct material control and accounting (MC&A) inspections at all remaining power reactors and at other facilities storing spent fuel. NRC will use the information from the inspections to make any necessary changes to the procedure for inspecting MC&A programs. NRC plans to incorporate periodic MC&A inspections into the baseline reactor inspection program.

NRC is revising the guidance to address physical inventory of loose rods and pieces, but does not plan to revise the American National Standards Institute (ANSI) standard requirements in 10 CFR 74.19 at this time.

Question 5. In April 2005, the National Academy of Sciences released a report on the safety and security of spent nuclear fuel storage. At our last hearing in March, you stated that, in December 2005, the NRC competed an assessment of the spent fuel situation at all plants. What is the status of this study and can you now discuss any of the findings?

Response. The assessments were completed in December 2005. At each plant, the assessment identified a number of strategies that could be used to mitigate the consequences of a beyond design basis event, and each plant is implementing the appropriate strategies. The strategies include various ways to cool the spent fuel to prevent or minimize damage and to minimize radiological releases. These strategies are consistent with the recommendations from the National Academy of Sciences.

Question 6. The Yucca Mountain repository is the intended destination for our Nation's nuclear waste, but the opening of that site has been delayed by several fac-

tors. Even if it did open in the near future, there is already enough spent nuclear fuel stored onsite at our nation's nuclear plants to fill the repository to capacity almost as soon as it was operating. Given that the NRC expects 17 or 18 more combined operating license applications over the next few years, what is the plan for safely managing the waste from these new plants? How does this impact the design and licensing review for new plants?

Response. The Nuclear Waste Policy Act of 1982, as amended, limits the authorized quantity of spent fuel for the initial repository to 70,000 metric tons of heavy metal or a quantity of solidified high-level radioactive waste resulting from the reprocessing of such quantity of spent fuel until such time as a second repository is in operation. For planning purposes, the Department of Energy has stated that of the 70,000 metric tons, 63,000 metric tons will be from commercial utilization facilities licensed by the NRC. With nuclear powerplants obtaining renewed licenses and with the potential for new plant licensing, these limits are expected to be reached by about 2010. Absent a legislative action to change the limits, we understand that the Secretary of the Department of Energy is to report to the President and the Congress on or after January 1, 2007, but not later than January 1, 2010, on the need for a second repository.

The Commission has expressed confidence that spent fuel and high-level waste produced by nuclear facilities can be safely disposed of and safely stored until safe disposal is available.

In its 1990 Waste Confidence decision, the Commission concluded that spent nuclear fuel can be safely stored without significant environmental impact for at least 100 years, if necessary. Spent nuclear fuel is being managed safely today and the Commission has every expectation that it can be and will be managed safely in the future at least with the same level of protection in place today.

The issue of safe disposal of spent nuclear fuel and high-level waste will be considered in the licensing proceeding for a geologic repository rather than in individual licensing proceedings for new plants. The environmental review for the licensing of new plants will rely in part upon the 2nd and 4th Waste Confidence findings as incorporated in 10 CFR 51.23(a); i.e., that reasonable assurance exists that a repository will be available by 2025; that sufficient repository capacity will be available within 30 years beyond the licensed life for operation (which may include the term of a renewed license); and that spent fuel can be safely stored on-site or off-site for at least 30 years beyond the licensed life for operation of the plant (which may include the term of a renewed license). The Commission has stated that it would consider undertaking a comprehensive reevaluation of the Waste Confidence findings if either of two criteria were met: (1) when the impending repository development and regulatory activities run their course; or (2) if significant and pertinent unexpected events occur, raising substantial doubt about the continuing validity of the Waste Confidence findings. Neither of these criteria have been met.

Question 7. The enacted provisions of the "Dirty Bomb Prevention Act"—contained in Section 651 of the Energy Policy Act of 2005 (EPAct), added a new Section 170H to the Atomic Energy Act of 1954. Under this provision of the law, the Commission was directed to establish a tracking system for radiation sources. These sources were defined by law to include Category 1 and 2 sources as well as "any other material that poses a threat such that the material is subject to this section, as determined by the Commission, by regulation, other than spent nuclear fuel and special nuclear materials." In its May 25 decision, the Commission switched courses from the 'common defense and security' approach to 'public health and safety' approach, transferring radiation source tracking responsibilities from a centralized national system to the states. As a lead negotiator on Title VI of EPAct, I share the view of its authors, Congress clearly intended the tracking system to be a national system. At the hearing, Senator Clinton requested that the NRC expand the time for comment and that it reconsider its decision. I support these requests. How will the Commission respond to Senator Clinton's requests? I would appreciate receiving a copy of any reply you send to her.

Response. We take the concerns raised at the hearing by Senator Clinton and in the letter from Senator Clinton and Representative Markey seriously. The Commission has extended by 25 days the period for public comment on the proposed change in basis for the rule from common defense and security to public health and safety and has added the letter to the rulemaking docket. In the rulemaking proceeding, the NRC will address the comments that we receive. In addition, the majority of the Commission submitted a supplement to the hearing record, which explains their views. Also, we are currently drafting a response letter to Senator Clinton and Representative Markey, and we will provide a copy of the response to you when it is issued.

With regard to the concerns expressed in your question, the national source tracking system will be a cohesive national system, will include information from the NRC, Agreement States, and DOE and will be developed and maintained by the NRC. The practical effect of basing the rule on public health and safety considerations, rather than on common defense and security considerations, is that the Agreement States, rather than the NRC, will be responsible with respect to Agreement State licensees for issuing legally binding requirements to those licensees regarding input into the national source tracking system, for conducting inspections to ensure compliance with the reporting requirements, and to take any necessary enforcement actions. The requirements imposed by the States will be identical to NRC requirements and will take effect at the same time as the NRC requirements.

The NRC is continuing to consider this matter and will carefully evaluate public comments as it completes the rulemaking process.

RESPONSES BY NILS J. DIAZ TO ADDITIONAL QUESTIONS FROM SENATOR VOINOVICH

Question 1. Chairman Diaz, I understand that a good portion of the work on new reactor licensing will involve environmental reviews—which involve other agencies, including the Fish & Wildlife Service, Department of Interior, EPA, and others. This means that even if NRC does its job, other agencies could hold this process up. Has the NRC alerted the other agencies about the 18 or more applications that you are expecting? Who makes the final decision, and is there a process for resolving differences of opinions between agencies? Provide in writing the Commission's plans and strategies to coordinate with other agencies, including state and local authorities, in an effective and efficient way to expedite the review process and reconcile any differences. One of the examples cited at the hearing was for the NRC to write letters to the Governors of those affected states to initiate coordination.

Response. In the past we have communicated with our Federal, State, Tribal and local counterparts on an informal basis before an application is submitted to ensure that our counterparts were familiar with the NRC licensing process, the scope of the environmental issues, and their opportunity to participate. As part of our overall Program Plan for New Reactor Licensing Activities, we intend to formalize these coordination efforts and ensure that our governmental counterparts are familiar with the plans for projects well before applications are filed.

The NRC's environmental reviews fulfill our responsibilities under the National Environmental Policy Act, or NEPA, to consider potential environmental impacts related to licensing. Other Federal agencies, such as the Department of the Interior (for example, the U.S. Fish and Wildlife Service), the Department of Commerce (for example, the Fisheries Service), and U.S. Environmental Protection Agency (EPA), have environmental protection authorities under other statutes; some of those authorities can be delegated to the States [such as under the Clean Water Act, or the Coastal Zone Management Act (CZMA)]. For a major Federal action requiring an NRC environmental impact statement (EIS), we do coordinate with our sister agencies to ensure that relevant environmental protection statutes are considered by the NRC prior to granting an authorization, permit, or license. The NRC staff formally engages official stakeholders, notably Federal, State, Tribal and local government agencies early in the NEPA scoping process to ensure that they can provide their insights on the scope of the review.

For the three early site permit (ESP) applications received to date (Clinton, Grand Gulf, and North Anna), the informal communications were successful in making these agencies aware of the proposals, the schedule, and the coordination needed. The Southern Nuclear Operating Company has indicated plans to submit an ESP application next month for the Vogtle site. The NRC staff has already interacted with certain Federal, State, and local government agencies as part of its pre-application outreach effort on the project. The staff will continue to interact with governmental agencies during the development of the EIS and will consider their comments. The staff plans to alert appropriate Federal, State, Tribal and local government agencies of the prospective combined license (COL) applications in accordance with the Program Plan.

The NRC action to authorize the construction or the operation of a nuclear powerplant is a necessary action, but it is not alone sufficient to build or operate a nuclear powerplant. The applicant must also obtain permits, licenses, and certifications under other environmental protection statutes from the other Federal, State, and local, and, in some cases, Tribal agencies. In these cases, interactions with the appropriate authorities are to be initiated by the prospective applicant, such as the Clean Water Act Section 401 certification. Under these statutes, such as the CZMA, there are appeal mechanisms in the case of disagreements.

The framework for conducting NEPA reviews is well-established in NRC guidance and practice, and, we believe, is unlikely to result in irreconcilable differences among the NRC and sister Federal agencies. If there is a fundamental disagreement among Federal agencies, then, under a rarely used provision, an EIS can be referred to the President's Council on Environmental Quality (CEQ).

On a program level, the NRC staff also communicates with its counterparts at EPA and CEQ. As recently as April, the staff afforded EPA and CEQ a briefing on licensing processes and prospective changes to keep them aware of the level of interest in licensing new nuclear powerplants. The NRC intends to continue to reach out to such sister agencies to keep them informed of developments and to interact with the EPA regional offices responsible for reviewing EISs.

The NRC has initiated infrastructure improvement activities to enhance the effectiveness of its practices and programs. In particular, the staff intends to conduct additional pre-application activities, which includes engaging governmental stakeholders; these will be formalized in each of the individual Project Plans. We would like to note, however, that a concerted effort by the applicant to interact early and frequently with all authorities and to keep authorities abreast of potential issues as they arise in essential for achieving an efficient licensing process; regardless of the outreach and communication efforts that any particular authority may choose to undertake on its own.

Question 2. One of the concerns identified in Mr. Beasley's testimony is that NRC may impose new license conditions or make changes to the licensing basis of the plant during construction—after a combined license has been issued and in the middle of construction. Chairman Diaz, please respond to this concern and inform the Committee of any safeguards that have been put in place to limit NRC staff authority in this regard?

Response. We believe that Mr. Beasley's concern relates to a proposed provision in the current 10 CFR Part 52 rulemaking. Specifically, proposed 10 CFR 2.105(b)(3)(iv) states that the notice of intended operation under § 52.103(a) may identify conditions, limitations or restrictions to be placed on the license in connection with the finding under § 52.103(g). This provision is intended to permit the NRC to allow interim operation if there is either: (i) a matter of ITAAC compliance that may be resolved during a period of interim operation under appropriate conditions, limitations or restrictions; or (ii) the NRC determines that there is a significant matter of non-compliance with the Commission's regulations that would otherwise form the basis for an order suspending operation, in the absence of such conditions, limitations or restrictions. This provision is consistent with the authority to allow interim operation, which was provided by Congress in section 189.a(1)(B)(iii) of the Atomic Energy Act of 1954, as amended by section 2802 of the Energy Policy Act of 1992. Thus, if an issue arises that can be corrected by the combined license holder during a period of interim operation under appropriate conditions, limitations or restrictions, the NRC can permit interim operation. The Commission believes NRC's existing regulatory authority in this regard is appropriate.

Question 3. As you know, Chairman Inhofe and I asked GAO to review the new Reactor Oversight Process (ROP) since it was implemented in 2000. Based on GAO's testimony for the record and the other testimonies for today, it appears that the ROP is working well and that it represents a significant improvement over the old process. However, the ROP failed to identify problems at Davis-Besse. I know NRC has implemented numerous corrective actions—but are you confident that this process is robust enough now to prevent another Davis-Besse?

Response. The NRC has taken extensive action to preclude the occurrence of an event similar to Davis-Besse. The NRC learned a great deal from the Davis-Besse experience, and we have modified our regulatory program from the lessons learned. We have also significantly enhanced our Operating Experience program, in order to ensure that information on issues and events are more systematically assessed for generic applicability. This includes information received from our international counterparts.

It is important to note that nuclear powerplants are designed with significant safety margin to ensure that the probability of a significant event occurring is very low. The plants are also designed with diverse and redundant safety systems, containment structures, and emergency planning programs to protect public health and safety should an unlikely event occur.

Question 4. At the March hearing, we found out that NRC expects a net increase of 500 to 700 employees (FTEs) over the next 5 years, and as result, the Agency need additional office space to support this growth. I know my staff has met with the General Services Administration to see if a Congressional authorization is nec-

essary to expedite a prospectus. Do you feel that GSA can meet NRC's needs in the timeframe needed?

Response. The Commission believes that the NRC would benefit from legislative action to meet the NRC's office space needs in a timely manner. We request approval of legislative language that would allow GSA to immediately begin procurement of space to keep pace with our accelerated hiring and need for workstations. While GSA has expressed a willingness to expedite our space request within the established prospectus approval process, we do not believe that GSA can meet NRC's needs for occupancy and consolidation in FY 2008 as needed. NRC submitted the request for our space to GSA on February 10, 2006. The GSA-provided time line for prospectus approval, including GSA processing, OMB clearance, and Congressional approval, will not result in NRC occupancy until mid 2009. Moreover, the traditional prospectus process requires that GSA follow competitive procurement requirements.

The NRC provided suggested legislative language would enable GSA to acquire space adjacent to our Headquarters White Flint Complex, thereby maintaining the consolidation benefits achieved in 1994, including maintaining our incident response capability which is significantly enhanced by ease of access by technical staff from various NRC offices.

Question 5. I am very encouraged to hear that you have exceeded your goal of hiring 350 people this year. NRC will be challenged in the coming years not just to meet future hiring goals but to retain the talented individuals who have recently joined the agency. Do you believe the NRC has the necessary authority to address its retention and recruitment needs?

Response. Yes, the Commission believes that the NRC currently has the necessary authority to address the Agency's retention and recruitment needs. The NRC will continue to evaluate and adjust its human capital strategies as market conditions change when vendors and utilities staff up for new plant construction in the 2008–2009 time frame. To remain competitive, we expect to increase our use of currently available recruitment and retention tools. Should the Commission determine that legislation is needed, the NRC would promptly inform you of our needs.

The Commission continues to be poised to successfully meet its critical hiring and retention challenges through our ongoing human capital planning, implementation, and assessment process and the various tools provided by the Energy Policy Act of 2005. We expect to have a critical hiring need for at least the next five years and will continue our aggressive efforts to recruit, hire and develop staff as we prepare for the receipt of the expected COL applications.

Question 6. In your testimony, you mentioned that you plan to implement your safety culture initiative (at least a first step) effective July 1, 2006. Have the regional inspectors been adequately trained to implement this significant undertaking in a consistent and effective manner?

Response. Yes, we developed a computer-based training program that all current reactor oversight process inspectors were required to take prior to the spring 2006 resident inspector counterpart meetings. We also provided training in each Regional Office during the spring 2006 resident inspector counterpart meetings. In addition, we are modifying the inspector qualification program so that all new inspectors joining the agency will have the training they need to effectively implement inspection program elements related to safety culture into their inspections. Other training development, including just-in-time training that will be taken by inspectors prior to performing selected supplemental team inspections, will be completed by the end of the 2006 calendar year and prior to being needed for any major team inspection.

Question 7. As we discussed at the last hearing, communication with the public is very important if they are to have confidence in NRC's oversight of nuclear powerplants. Unfortunately, I have heard numerous complaints that the information NRC provides on its website is very technical and difficult to understand—and that's when you can find the information. Chairman Diaz, does the NRC have any plans to improve this very important public relations tool?

Response. The Commission agrees that communication with the public is very important for improving the public's confidence in NRC's oversight of nuclear powerplants, and we are committed to having a website that fosters public confidence. We strive to be an open agency and as such provide public access to the vast majority of our official documents via the web. As with any communication tool, we continually seek to make improvements, including our work to provide a better search engine, that may make it easier to locate information on the web. Our website has a specific "help" link and "contact us" link that enables any member of the public to seek assistance or to communicate comments and suggestions to our website staff.

Question 8. Can you provide an assessment of management challenges, especially in the area of new reactor licensing? NRC should solicit input of its customers (i.e., applicants) to identify potential management issues and challenges and develop solutions for a more timely and efficient process.

Response. Key management challenges in the new reactor licensing area include developing the regulatory infrastructure and human capital needed to review the new reactor licensing applications expected over the next several years. To address these challenges, the staff is working to develop efficient and predictable review processes, whose efficiencies will also help to reduce the resources needed to complete the reviews. For example, the staff is working to revise 10 CFR Part 52 to provide clarification and reorganization of the existing requirements and to address operational program information to implement recent Commission policy decisions. The NRC's work on this rulemaking has included significant stakeholder interaction through public meetings and the formal solicitation of public comment on the proposed rule. The staff is developing a combined license (COL) application regulatory guide (DG–1145) which can be used by applicants to develop complete and quality applications. The staff is also updating the Standard Review Plan (NUREG–0800) which will be used by the NRC staff in their review of the applications. The staff is holding monthly public workshops as part of developing the COL application regulatory guide. The staff also solicited and obtained stakeholder input for prioritizing the work to update the standard review plan sections that are expected to be used for reviewing new plant licensing applications.

The staff has also developed a design centered review approach (DCRA) for the review of multiple combined license applications that reference the same design. This approach will use, to the extent practicable, a "one issue-one review-one position" strategy in order to optimize the review effort and resources needed to perform these reviews; that is, the staff will conduct one technical review for each reactor design issue and use the result of the review to support the review of the design certification and each combined license application. The staff has held discussions with applicants on this review approach and issued Regulatory Issue Summary (RIS) 2006–06, "New Reactor Standardization Needed to Support the Design-Centered Licensing Review Approach," on May 31, 2006, to explain NRC's expectations regarding standardization in order to make the DCRA effective. The RIS is intended to promote standardization of COL applications and to facilitate the establishment of a predictable and consistent method for reviewing applications. To this end, the NRC requested voluntary submission of information regarding addressee schedules and plans for standardization. Industry is working to provide a response to this request.

NRC management and staff have also met on several occasions with members of the New Plant Oversight Committee (NPOC) to discuss strategic planning for new reactor applications and NRC's review of these applications. NPOC members include Senior Executives from utilities and vendors participating in new nuclear plant activities, and Senior members from the Nuclear Energy Institute (NEI). NRC and NPOC have agreed to establish working groups which would meet on a regular basis to identify and discuss new reactor licensing issues and their resolution.

With respect to developing the human capital needed, the NRC is aggressively hiring/recruiting to levels consistent with the design centered review approach. New employees are receiving training in our regulatory processes as well as our internal business processes, in addition to the wide range of engineering and other technical training that is available to them. The NRC will be looking to modern information technology and document management techniques to further facilitate the development of our human capital and improve our processes, where practicable.

RESPONSES BY NILS J. DIAZ TO ADDITIONAL QUESTIONS FROM SENATOR VITTER

Question 1. As part of the new Part 52 process, companies may submit an application for an Early Site Permit (ESP) for potential locations. Once such sites are approved by the NRC, this permit is good for up to 20 years. However, recent discussions of the COL application process have indicated that the environmental review, essentially done as part of the ESP application, might be reviewed again resulting in potential delays and additional costs to the COL application review process. Will having an ESP be useful to obtaining a COL? When will an agreement be reached on the finality of the ESP environmental review?

Response. The early site permit (ESP) is a Commission approval of a site or sites for one or more nuclear power facilities. The ESP application and review process makes it possible to evaluate and resolve safety and environmental issues related to siting before the applicant makes large commitments of resources.

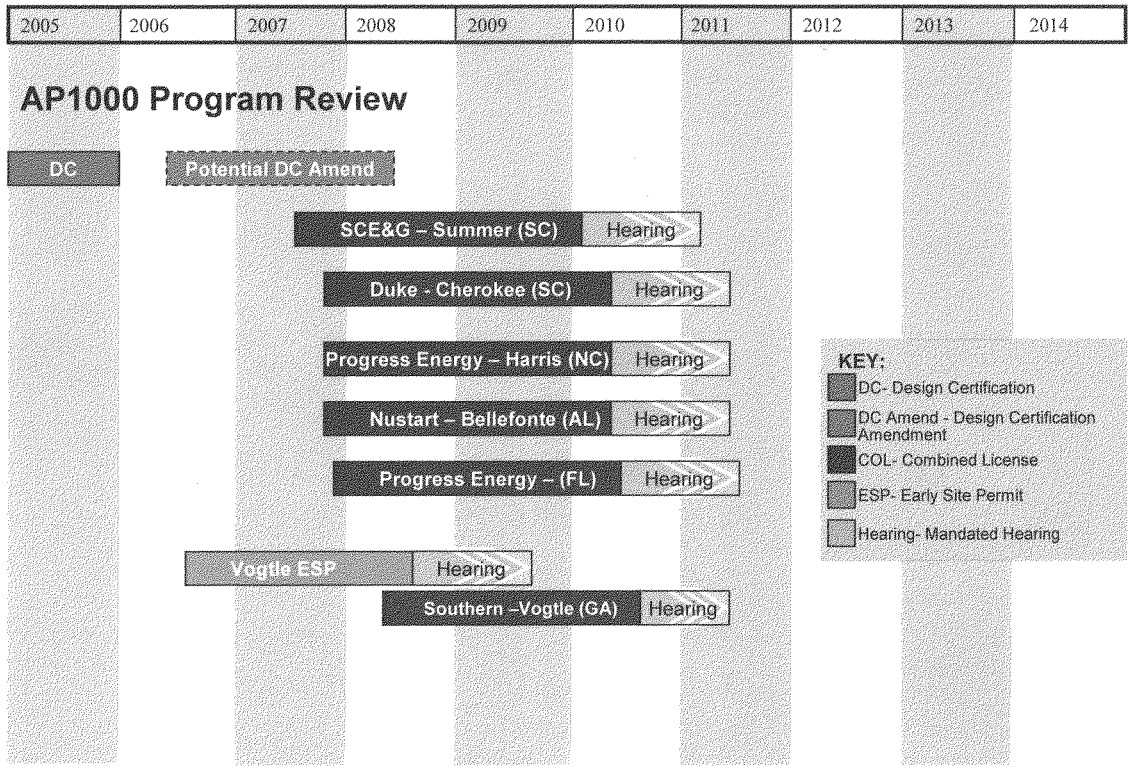
ESP applicants have alternative approaches in providing information to the NRC. The first three ESP applicants chose not to provide detailed information about a specific reactor design for their sites. Rather, they provided the values of parameters and characteristics of designs and associated facilities called a plant parameter envelope (PPE), as a surrogate for an actual reactor design and its interface with the environment. Using this approach allows the applicant to preserve flexibility, to avoid committing to a particular vendor, and to defer the selection of a reactor design until the COL stage. In these cases, no additional analysis of the environmental impacts that have been evaluated would be required if the applicant chooses a design that falls within the PPE values.

Alternatively, an applicant can designate a specific reactor design and associated facilities. In this case the actual design characteristics, the actual location of the reactor or reactors on the site, and the actual design interface with the environment can be evaluated thoroughly to assess the construction and operational impacts. At the time of the COL application referencing the design-specific ESP, the staff would not reconsider earlier evaluations if the design is unchanged from that previously evaluated.

The case of Dominion Nuclear North Anna, LLC's (Dominion), North Anna ESP application illustrates some of the benefits of the ESP process. At a late stage in the North Anna ESP review, the applicant recognized the existence of a significant challenge to obtaining the necessary state approvals and revised its cooling system design. Dominion stated that it ". . .recognizes that the revised cooling system approach has affected the NRC Staff's schedule for completion of its review of our application. However, the ESP process has provided an opportunity to resolve important issues at an early stage. The ESP process is intended to allow resolution of siting issues before major resources are committed to plant design and construction, and before the COL stage. By addressing cooling system issues at the ESP stage, the additional work that is now being performed will establish a foundation for success and reduce the potential for delays in a subsequent COL proceeding."

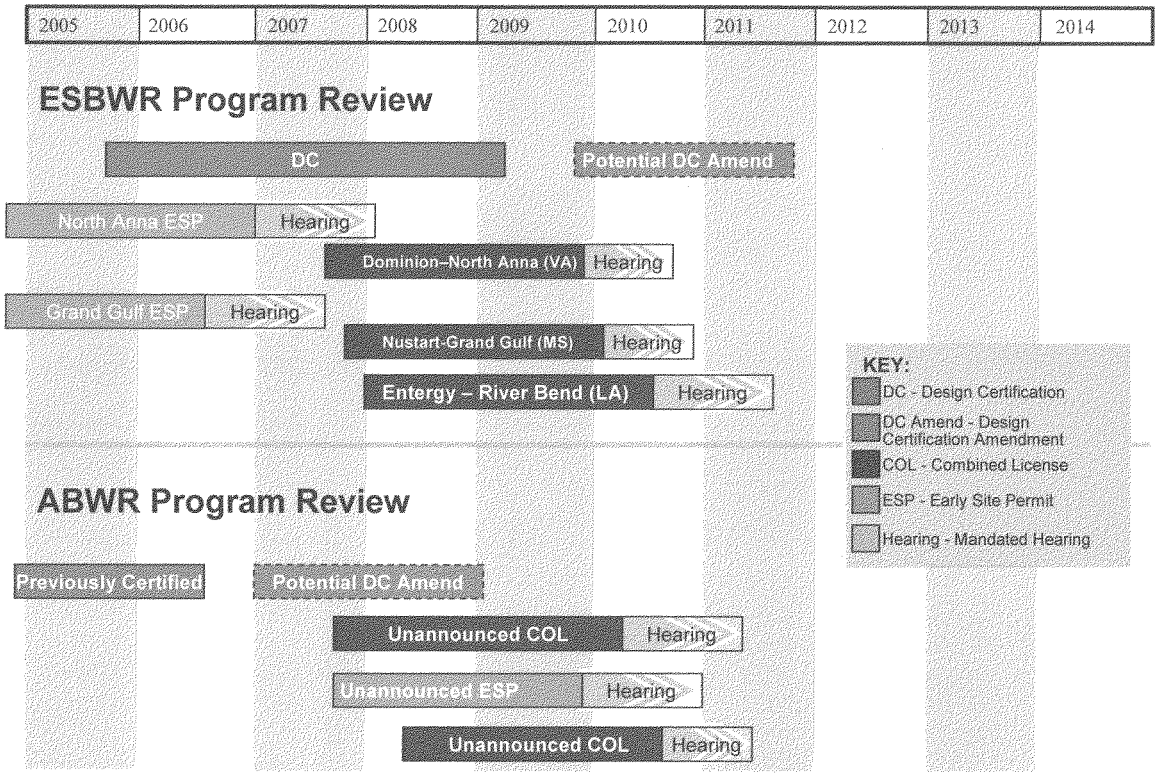
New Plant Licensing Applications

Estimated Schedule (Calendar Years)



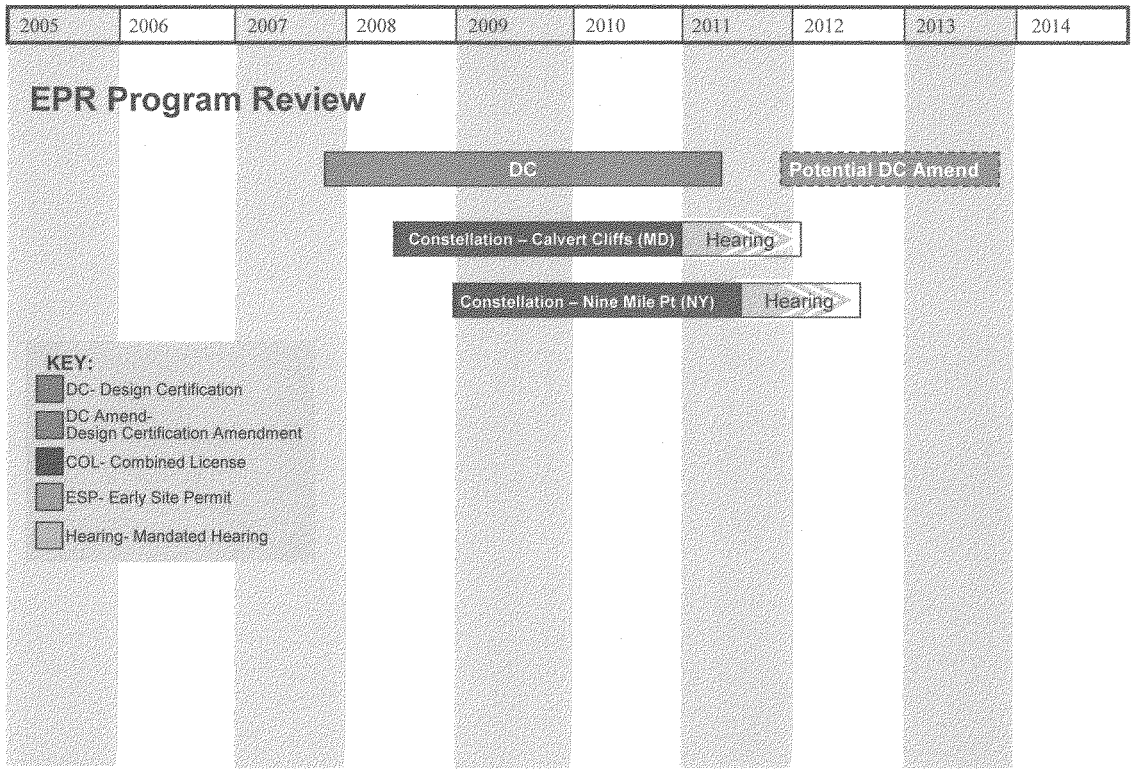
New Plant Licensing Applications

Estimated Schedule (Calendar Years)



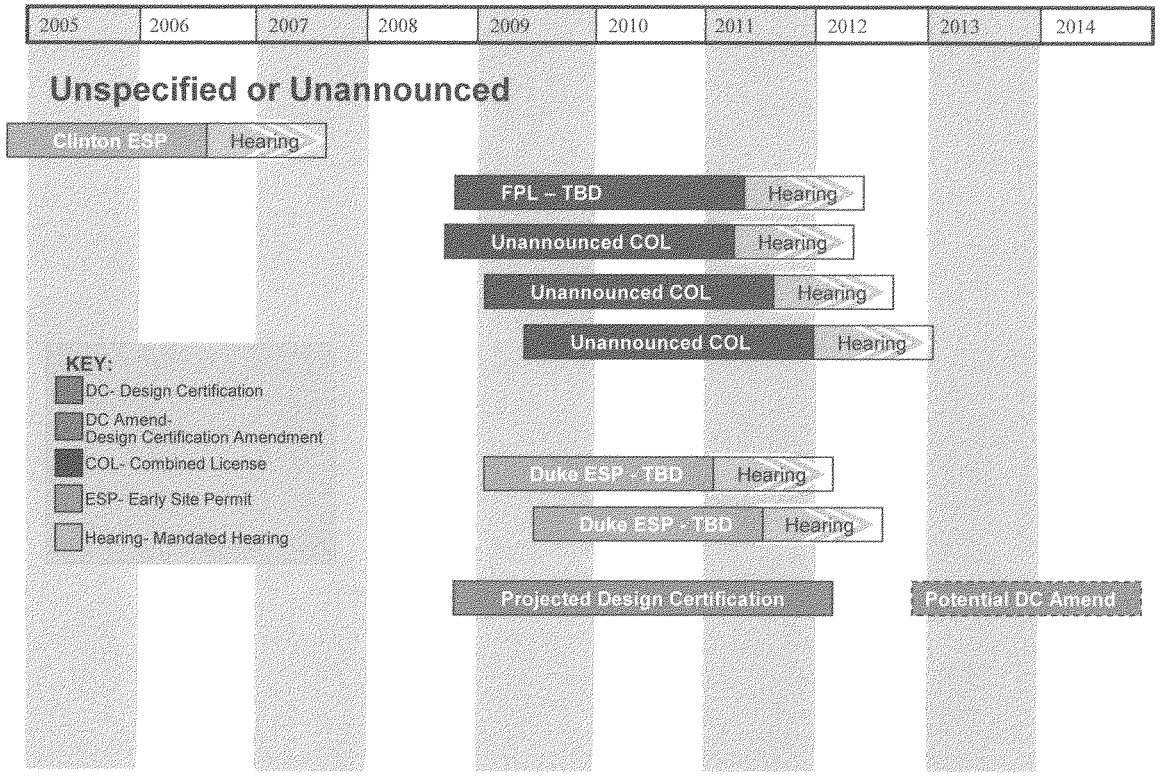
New Plant Licensing Applications

Estimated Schedule (Calendar Years)



New Plant Licensing Applications

Estimated Schedule (Calendar Years)



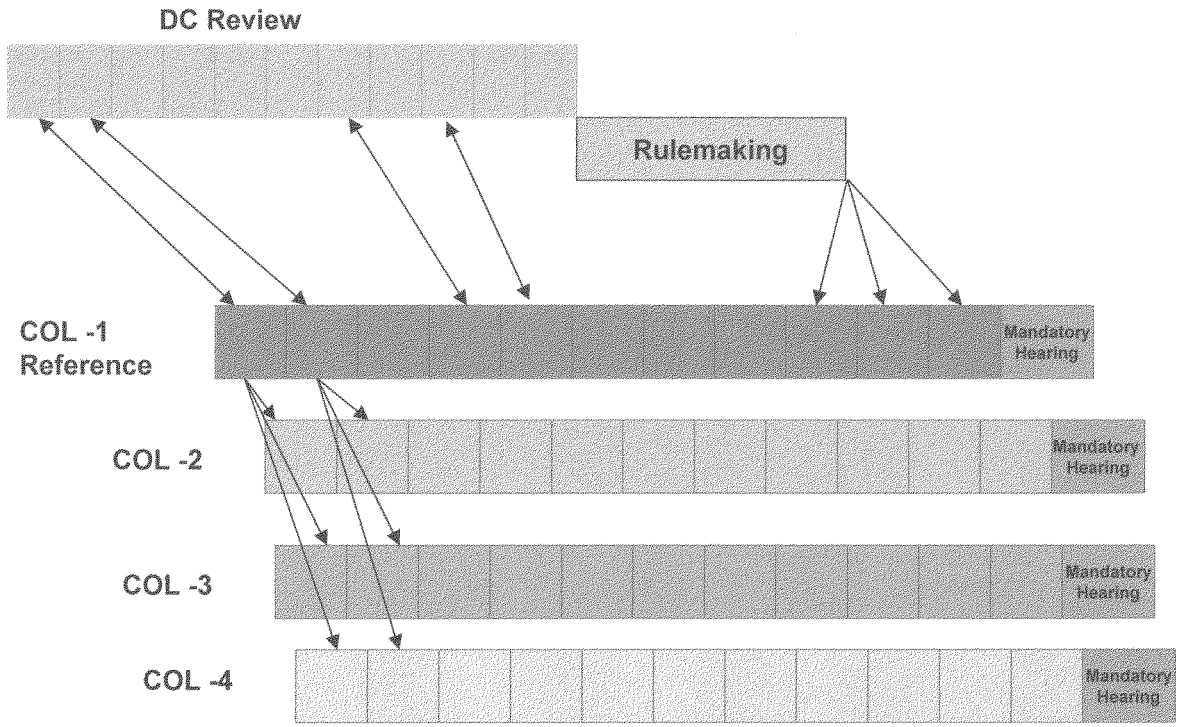
Summary Estimate of New Nuclear Power Plants Based on the Design Centered Approach

(as of 6/19/06)

	COLs	Units
AP 1000	6	11
ESBWR	3	3
EPR	2	2
ABWR	2	4
Unspecified	4	4
Total	17	24

Number of Reference COLs: 4
Number of Environmental Reviews: 17+

Design-Centered Review Approach



STATEMENT OF J. BARNIE BEASLEY, JR., PRESIDENT AND CEO, SOUTHERN NUCLEAR COMPANY

Mr. Chairman, thank you for the opportunity to appear before the subcommittee today regarding the NRC's regulatory oversight of our Nation's nuclear powerplants. My name is J. Barnie Beasley Jr. I am president and chief executive officer of Southern Nuclear Operating Company. I have attached a brief resume to my testimony as Exhibit 1. [Resume retained in committee's file.]

Southern Nuclear is headquartered in Birmingham, Alabama and is a subsidiary of Southern Company. Southern Company is a public utility holding company with its principal office in Atlanta Georgia. In addition to Southern Nuclear, Southern Company is the corporate parent of five electric utilities: Alabama Power Company, Georgia Power Company, Gulf Power Company, Mississippi Power Company, and Savannah Electric Company, which will soon be merged with Georgia Power Company, as well as Southern Power Company and Southern Company Services, Inc. Southern Company's subsidiaries provide reliable and affordable electric service to 4.2 million retail and wholesale customers across the southeastern United States.

Southern Nuclear is the licensed operator of the Alvin W. Vogtle Electric Generating Plant and the Edwin I. Hatch Nuclear Plant, which are both two-unit nuclear plants partially owned by Georgia Power Company, and the Joseph M. Farley Nuclear Plant, which is a two-unit nuclear plant owned by Alabama Power Company. The six nuclear units operated by Southern Nuclear comprise over 6000 megawatts of generating capacity and represent approximately 17 percent of the total annual generation of the Southern Company system. Southern Nuclear's fleet historically has been recognized as among the best performing nuclear plants in the country and are among Southern's most efficient generating resources. They provide our customers with reliable and reasonably priced electric energy.

Plants Hatch and Farley have already extended their operating licenses for an additional twenty years of operation each, and the application for Plant Vogtle's license extension will be filed with the Nuclear Regulatory Commission ("NRC") next year. The renewal of Plant Vogtle's license will ensure that Southern will be allowed to operate its existing fleet into the middle of this century.

Southern Nuclear has also been charged by Southern Company with performing the technical work necessary to preserve the option of new nuclear generating capacity to meet the growing needs of the Southern system. In this role, Southern Nuclear will file an application for an Early Site Permit later this summer in order to determine the suitability of the Vogtle site for two additional nuclear units at Plant Vogtle. Southern is also a member of the NuStart LLC consortium, which is a party to a cooperative agreement with the Department of Energy ("DOE" to develop a standard application for a Combined Operating License ("COL") for two reactor technologies and the final, construction-quality design for those reactors. Southern is on a schedule to submit its own application for a COL by early 2008 for two additional units at the Vogtle site in Georgia.

I am gratified to have the opportunity to appear before the Committee today to discuss the regulatory environment in which our nuclear units operate. Prior to my current position, I served Southern Nuclear in a variety of positions including Plant Manager of Plant Vogtle, Vice President of the Vogtle and Farley Plants, and Chief Nuclear Officer for the Southern fleet. My experience leads me to believe strongly in the benefits nuclear power provides to the Nation's economy and to the environment. Southern Company is committed to the continued safe and economical operation of our nuclear fleet. We also believe that the renewal of interest in the construction of new nuclear units by the nation's electric generating companies is a very healthy development and that the construction of new nuclear units will help the nation continue to provide better lives for its citizens and to compete in the global economy. We very much appreciate your leadership, Mr. Chairman, and that of the rest of the Committee, in enacting the nuclear provisions of the Energy Policy Act of 2005, which not only included needed and prudent amendments to the Atomic Energy Act, but also helped to spur the resurgence of interest in new nuclear generation in this country.

Based on many years of experience in operating nuclear powerplants, I am convinced that a consistent, transparent, and predictable regulatory environment in which both nuclear operators and the public have confidence is essential to preserving the benefits from the existing nuclear fleet and to realizing even greater benefits from a new fleet of advanced light water reactors across the country. We appreciate the unique status of nuclear powerplants in this country and welcome the public's scrutiny of the safety and security of our operations. The excellent nuclear safety record of the industry's existing fleet, and the innovative safety features of the advanced light water reactor designs that will comprise the next fleet of nu-

clear plants, provide ample evidence that these units can be and have been operated at extremely high levels of safety. In order for companies to make decisions to commit the investment necessary to construct these new designs, the economic risk associated with the licensing, construction and operation of these facilities needs to be comparable to that of other forms of base load generation. The deployment of these new units will depend in large part on investors' perception of that risk, as demonstrated by the NRC's licensing process, the NRC's oversight of our existing facilities and the operating performance of the current fleet of plants. Although we obviously believe that the regulatory environment is a positive one for the development of new units, we also believe that the industry and NRC should continue to work together to make more improvements in the regulation of the existing nuclear fleet and to ensure that the process for licensing the next fleet is predictable, prompt and efficient.

My testimony today will focus on four major themes:

1. The need for consistency, transparency and predictability in the regulatory environment for the current fleet of nuclear powerplants, including the effect of the regulatory environment for the current fleet on decisions to construct new plants;
2. The connection between a predictable and efficient licensing process for new nuclear powerplants and the investment decisions potential investors need to make to pursue the development of new plants;
3. The need for progress on the nuclear waste issue in connection with the development of new nuclear plants; and
4. The need for adequate funding of the DOE's nuclear power 2010 program to ensure that new plants can be licensed and constructed on a schedule that will allow the plants to come online soon enough to meet the growing demand for electricity.

CURRENT REGULATORY ENVIRONMENT

Under Chairman Diaz' leadership, the NRC has made great strides in the last decade toward risk-informed and performance-based regulation. The NRC's revised reactor oversight process, implemented in 2000, was a major step forward in concentrating NRC and operator resources on areas that benefit public health and safety the most, and at the same time provides for enhanced NRC scrutiny of plants that have demonstrated degraded performance in these areas. The NRC's adoption of objective performance indicators against which plant performance is judged, instead of subjective evaluations of operating methods and practices that can vary from inspector to inspector, has improved the reliability of the regulatory process and has resulted in even greater improvements in the safety and performance of the current fleet. These improvements have helped plant operators focus resources on important issues that are essential to safety and have improved the overall performance of the industry.

It is essential that NRC continue to build on the progress made toward objective, predictable regulation. Care must be taken to increase the use of formal regulatory processes to implement new regulatory requirements. Use of formal regulatory processes ensures that the Commission has input from all affected stakeholders, provides a record for regulatory decisions that the industry, the Congress and the public can review and understand, and helps to enhance objectivity of requirements. Regulatory requirements based on such deliberative processes invariably enjoy greater acceptance by the industry and the public than those imposed informally, without full stakeholder participation.

Additional progress can also be made in the predictability of the NRC's regulatory process, particularly with respect to the re-interpretation of requirements by NRC staff. New interpretations of previously well-understood requirements, particularly when developed without resort to formal rulemaking or backfit analyses, weaken industry confidence in the regulatory process. To the extent such re-interpretations materially improve public safety, they can surely withstand the scrutiny of formal processes, and public confidence in NRC regulation will be enhanced as a result.

LICENSING PROCESS FOR NEW PLANTS

The next fleet of nuclear plants in this country will be licensed under the process outlined in Part 52 of NRC's regulations. This process, which is an outcome of the Energy Policy Act of 1992, was designed to avoid the licensing problems that plagued the current fleet of plants. The key factors in this process are the elimination of duplicative reviews of the same issue at successive stages of the licensing of a new plant and the final resolution of all safety and environmental issues before construction of the plant begins. The renewal of interest in nuclear power in the electric industry is closely tied to our expectation that NRC, using Part 52, can li-

cense new facilities in a predictable, efficient way. It is essential that Part 52 be implemented as intended in order for the investors to have confidence that new nuclear plants can be licensed, constructed and operated on a schedule that is both predictable and competitive with other forms of base load generation, such as large coal units.

Timely and predictable licensing is critical to investor confidence in new nuclear units. Delays in the licensing process necessarily delay the construction and operation of the units. These delays cause severe financial consequences for the builders of the plants, which must look to other, more expensive forms of generation for the supply of electricity to their customers to fill the void caused by the delays. Without a licensing process that is both reasonable and predictable, potential developers of nuclear units, many who like us have expressed an initial interest, will find it difficult to justify continuing with the final licensing and construction of new nuclear powerplants, notwithstanding the obvious environmental benefits and fuel diversity that nuclear generation provides.

The final resolution of environmental and safety issues at the correct point in the licensing process is a major ingredient in the efficiencies provided by the Part 52 licensing process. Safety issues related to a standard reactor design certified by the NRC, for example, should not be re-reviewed or litigated during the proceeding on a Combined Operating License referencing that design. Similarly, environmental issues reviewed by NRC staff and resolved during the proceeding for an early site permit should be treated as finally resolved in that proceeding and should not be subject to re-review or litigation during the COL process. Elimination of duplicative and redundant licensing reviews will help NRC to use its resources more efficiently, and reduce the number of additional licensing staff needed for the multiple COL applications expected to be submitted over the next several years.

As currently drafted, Part 52 provides for such finality and provides confidence that the process can be implemented in a predictable, efficient way. There is no need for redundant review and litigation of the same issues at each step of the process, which would increase the delay and uncertainty of the process. The process that is in place for both standard design certifications and early site permits provides ample opportunity for staff review and public involvement in all issues relevant to those licensing actions. It is essential the implementation of the process, as well as any proposed changes to part 52, respect the concept of finality so that potential developers and investors can have confidence that new plants can be licensed, and therefore constructed, on a predictable schedule.

Earlier this year, the NRC proposed a rulemaking to revise its regulations, as they relate to Part 52 that is 150 pages long and contains a multitude of changes to the NRC's rules. The sheer volume of changes contained in proposed rulemaking introduces great uncertainty into the licensing process, at a time when several applicants are actively preparing COL applications. In addition, as demonstrated by the industry comments on the proposed rulemaking submitted by the Nuclear Energy Institute, which I endorse, many of the proposed revisions conflict with the principles that make Part 52 a workable licensing process. As Chairman Diaz has emphasized, high quality applications are critical to the NRC's ability to complete its licensing work for new plants on a timely basis. The proposed rulemaking, in its current form, will make preparing such an application much more difficult and time consuming without a corresponding benefit to the safety of the new fleet of plants.

The other keystone of the Part 52 process is the resolution of all safety issues prior to the commencement of construction of the facility. The Combined Operating License process requires applicants to provide all information necessary for the NRC to license the facility, and review operating programs and procedures, prior to the issuance of the license. All licensing issues are required to be finally resolved prior to construction, with the only questions after construction being whether the plant has been constructed in accordance with the license The licensee is required to construct and operate the plant in conformance with the Combined Operating License with oversight by NRC inspection and enforcement programs. The licensee must prove that the plant has been constructed in accordance with the license by conducting inspections, tests and analyses and by satisfying acceptance criteria prior to loading fuel. This process ensures that the unit has been constructed and will be operated as licensed. In order for the licensing process to function as envisioned by the industry, and I believe by Congress in the Energy Policy Act of 1992, NRC must strictly observe the limits on its authority to impose new license conditions or make changes to the licensing basis of the plant during construction.

The industry's renewed interest in pursuing a new fleet of advanced light water reactors reflects our confidence that the NRC and the Congress are committed to the regulatory philosophy embodied in Part 52. The industry and NRC have made

good progress toward implementing the process, consistent with the requirements of the Atomic Energy Act and the need for new base load generation in the country. For example, the NRC and the industry have reached an understanding regarding the concept of standard COL application reviews. Except for site specific issues, NRC could review such standard application at one time for all applicants referencing a particular reactor design. Similarly, we have made some progress in adapting the Design Certification, Early Site Permit and Combined Operating License processes so that those processes can proceed concurrently for a particular plant, resulting in a more streamlined process. This could compress the total time needed to complete these processes, compared to the time required if each process was pursued sequentially. Each of these adaptations is consistent with existing law and regulation and could help NRC and industry to more efficiently utilize their limited resources.

We recognize, however, that we will all have to be vigilant to ensure that the principles of predictability and finality underlying Part 52 are followed in practice. The principles underlying Part 52 and that were embodied in the Energy Policy Act of 1992 were based on the industry's and the NRC's experiences of the late 1970s and 1980s, when long delays in licensing and construction, uncertainty in the regulatory process, and significant cost overruns due to evolving regulatory requirements were routine. We should not let the passage of time erode our memory of those lessons. The industry is concerned that some of the revisions to Part 52 proposed by the NRC this Spring could undermine the principles underlying the improvements to the licensing process made by the Energy Policy Act of 1992. Changes to Part 52 that make the process less predictable and efficient will not only result in a less effective licensing process, they could negatively impact the current enthusiasm on the part of investors in new plants. We encourage the NRC and its staff to carefully review the industry's comments and carefully consider them in promulgating any revisions to Part 52 and encourage the Congress to diligently exercise its oversight authority by ensuring that any revisions to the regulations are consistent with the intent of the legislation.

USED NUCLEAR FUEL

With respect to the issue of new nuclear plants, it is also important to note that there are policy issues other than the licensing process that are important to the economic viability of the plants and the acceptance of the plants by the public. The most obvious issue is the continuing delay on the part of the Federal Government to deal effectively with the issue of used nuclear fuel. Although the industry has demonstrated that used fuel can be safely stored at reactor sites on a temporary basis, the government must resist the urge to treat this temporary measure as a *de facto* permanent solution to the issue of where and how to dispose of used fuel. The ratepayers of Georgia Power have paid approximately $580 million and the customers of Alabama Power have paid almost $300 million to the Federal Government for used nuclear fuel disposal and have received nothing in return. State regulatory authorities authorize the collection of nuclear waste fees from customers and the recovery of the cost of temporary storage facilities on reactor sites. Since many of the new fleet of plants, including Southern's, are expected to be built under cost of service regulatory structures, these same regulatory authorities will also play a critical role in authorizing most potential new plant developers to pursue such investments. Aside from the obvious inequity of forcing nuclear operators and their customers to pay billions into the federal Treasury for disposal services that are not being provided, the communities where our current fleet of plants operate and where the next fleet of plants will be constructed want to know when the used fuel from the plants will be removed to a central repository. State officials are becoming increasingly impatient with the federal Government's failure to make concrete progress on this issue, which places pressure on all of our plants. The nuclear industry and the public needs and expects the federal government to fulfill its responsibilities under the Nuclear Waste Policy Act.

FUNDING FOR NUCLEAR POWER 2010

Finally, in order to bring new plants on line on a schedule that matches the growing demand for new base load generation, it is essential that the Department of Energy's Nuclear Power 2010 program be adequately funded. Appropriation of the federal share of the funding for one-time design finalization and COL development costs is a fundamental basis for the renewal of interest in new nuclear plant development. Any shortfall in the funding for this program will increase the cost and risk associated with new plants, and will reduce their attractiveness to investors as compared with other more traditional forms of generation.

CONCLUSION

In summary:

1. Risk-informed and performance based oversight of our existing reactor fleet is critical not only to our existing fleet of plants but to the industry's willingness to invest in new nuclear powerplants;

2. An efficient and predictable licensing process is critical for the licensing of new plants. Proposed revisions to Part 52 that are contrary to those principles should be rejected;

3. States with existing or proposed nuclear plants want to see real progress by the federal government in fulfilling its obligation to remove used nuclear fuel from nuclear plant sites; and

4. Adequate funding of Nuclear Power 2010 is essential to bringing a new fleet of nuclear plants online on a schedule that will satisfy the growing demand for electricity in this country.

Mr. Chairman, I want to thank you and the other members of the committee again for your support of nuclear power and for the opportunity to appear before you today. I will be happy to answer any questions you might have.

RESPONSE BY J. BARNIE BEASLEY, JR., TO AN ADDITIONAL QUESTION FROM SENATOR INHOFE

Question. Mr. Beasley, your statement suggests that there still are considerable amount of uncertainties in NRC's new reactor licensing process. Do you have any suggestions for this committee either legislatively or through other means as to how to mitigate these uncertainties? Obviously regulatory certainty is a key to the future success of the nuclear industry.

Response. As I stated in my testimony, we believe that the process currently outlined in the Commission's regulations provides for the regulatory certainty needed for the licensing of new nuclear powerplants, provided that the process is implemented in a consistent, efficient way. The primary threats to regulatory certainty in the new licensing process are several provisions of the NRC's proposed rulemaking amending its licensing process. Among these are provisions which would make it easier for environmental issues that have been resolved in an earlier stage of the process, such as in an early site permit proceeding, to be reopened during the COL process. Another proposed revision to the NRC's rules suggests that additional license conditions could be added to the COL as the NRC staff makes its findings regarding the satisfaction of inspections, tests, analyses and acceptance criteria (ITAAC) as a prerequisite to loading fuel, which is directly contrary not only to the fundamental purpose of the COL process but to Congress' intent in enacting the nuclear licensing provisions of the Energy Policy Act of 1992.

Because any licensing process is only as effective as its implementation in practice, I believe that the most effective thing Congress can do to mitigate this uncertainty is to continue to exercise its oversight responsibilities with a view toward ensuring that NRC performs its duties in a consistent way, and that changes to Part 52 are minimized to enhance, rather than detract from, regulatory predictability.

RESPONSES BY J. BARNIE BEASLEY, JR., TO ADDITIONAL QUESTIONS FROM SENATOR VOINOVICH

Question 1. Mr. Beasley, for the benefit of this committee, can you lay out a time line for when you expect to begin and complete construction, and have the plant go on line generating electricity?

Response. We expect to file an application for an Early Site Permit for two additional units at the Plant Vogtle site in August of this year. By early 2008, we expect to file an application for a Combined Operating License. If all goes according to schedule and the decision is made to begin construction, we would expect to begin site preparation by 2010 and commence the major construction in 2011. Our scheduled date for commencement of operation for the first new Vogtle unit is projected for the mid-2015 to 2016 timeframe.

Question 2. At the hearing, we talked about a number of factors that are outside of the NRC's control, such as State and local government permits and authorizations required in siting, licensing, and construction of a new nuclear plant. Have you and others in the industry been engaging the appropriate State and local officials? Are there any generic issues at the state level that can be addressed by the industry as a group in a comprehensive way?

Response. Southern Nuclear Operating Company and Georgia Power Company have engaged in discussions with a variety of state regulatory officials concerning the COL application for the new Vogtle units. These include the state public service commission, state environmental officials, and state and local emergency response agencies. Interaction with each of these agencies is critical to the ability to license and/or construct a new nuclear powerplant. Because these issues tend to be state and site-specific, approaching these issues from a generic perspective is difficult, and could be confusing for the state officials involved. We believe these issues are approached more clearly and effectively on an individual basis by companies' interaction with their own state officials.

I do agree with your suggestion at the hearing that close coordination and communication between federal and state officials involved in the licensing and construction process would be helpful to our efforts to bring new plants on line. Expressions of support for new nuclear plants from federal officials would be helpful to our interactions with state officials. The converse is also true. Expressions of support from state officials for new plant efforts are helpful to our interactions with federal regulators.

Question 3. Other than the ongoing rule change, I am interested in other concerns that you have for constructing new plants. What do you see as the biggest challenges in the licensing process? How about financing the construction of a new plant? Do you think we have the people for engineering, construction, and operation of all of these new plants that are projected? Will the public accept new nuclear plants?

Response. All of the issues mentioned in your question are challenges to some degree. The biggest challenge in the licensing process is that it is untested and, at this moment, still evolving due to NRC's proposed rulemaking. This uncertainty is one of the, if not the primary, variables cited by financial analysts in assessing the risk of investment in new nuclear powerplants. The availability of an adequate workforce to design, license, construct and operate new plants is also an issue of concern. We certainly have to attract people to our industry and adequate numbers of engineering and construction personnel are essential to this effort. Attracting and training a workforce to operate the new plants, while at the same time maintaining the excellent performance of our current fleet, is equally critical. My belief is that as new plant activity becomes more of a reality that new people in sufficient numbers will be attracted to the industry. Certainly, support for engineering and other technical education by the federal government is important to creating an adequate supply of trained workers. It should be noted that the increased nuclear plant construction activity is world wide. In fact, our plans in the United States pale in comparison to what some other countries are planning. With that said, we should expect to compete for resources and talent on a global level.

We believe that the public generally will accept and support new nuclear powerplants. In fact, the question most asked in Georgia is why we are waiting so long to commence construction and bring the new plant on line. As I stated in my testimony, I believe progress on issues such as the disposal of used nuclear fuel would engender even greater levels of support from our citizens, and our state and local governments.

Question 4. I have heard that we might have to rely on foreign countries like France or Japan to make key reactor components for these new plants because we have discontinued building nuclear reactor components in the past two decades. Is this true?

Response. Yes. Based on our preliminary discussions with potential vendors, we believe it is likely that at least the first group of plants will be heavily dependent on foreign sources of supply for key components. Over the 30 years since the last nuclear plant was ordered in the United States, many of the domestic vendors who supported construction of nuclear plants closed their doors. Because nuclear construction has continued in Europe and Asia, a small number of vendors have continued to operate there.

Question 5. Can you talk a little bit about the projected electrical power needs in the region that your company services and how nuclear power compares with alternative energy sources such as coal, gas, hydro, wind, solar, or biomass in meeting this demand?

Response. The region served by Southern Company is one of the fastest growing regions in the country. Georgia, which is served by Georgia Power Company and our prospective co-owners in the additional Vogtle units, Oglethorpe Power Company, Municipal Electric Authority of Georgia, and the City of Dalton, projects a growing need for base load generating capacity through at least the mid-2020s. We believe

that the bulk of this need will have to be served by a combination of new clean coal units and nuclear power. Additional generation from hydroelectric facilities as well as from wind, solar or biomass simply cannot support enough reliable baseload generation to meet our growing needs. However, the company is pursuing the development of such renewable sources of generation where feasible.

Question 6. Mr. Beasley, can you describe the impact the Federal government's continued delay in opening up a permanent repository for spent fuels at Yucca Mountain has on your company's decision making process to pursue new reactor licensing?

Response. Because we have strong local support for nuclear power and because we have demonstrated the ability to safely store fuel temporarily on-site, the Government's delay in opening the repository has not prevented us from going forward with our plans to seek a COL on the schedule indicated above. Notwithstanding our enthusiasm for nuclear power as a generation option, however, the Government's delay in meeting its obligations under the Nuclear Waste Policy Act of 1982, as amended, complicates the development of new plants. As Mr. Book testified at the oversight hearing on June 22, 2005, the financial community may attach a risk premium for used nuclear fuel management costs to financing for new nuclear powerplants. Similarly, state regulators, whose approval will be necessary to commence construction of a new nuclear powerplant, are increasingly frustrated with the Government's failure to remove used fuel after the ratepayers of Georgia have paid over $580 million into the Nuclear Waste Fund. Finally, opponents of new nuclear construction frequently cite the delay in opening the repository as a reason not to build new plants.

RESPONSES BY J. BARNIE BEASLEY, JR., TO ADDITIONAL QUESTIONS FROM SENATOR JEFFORDS

Question 1. Your testimony strongly supports the NRC's use of formal rulemaking procedures, including public review and participation. I am pleased you have made such a statement. Too often in this Committee, utilities and businesses argue for cutting rulemaking procedures short. They favor more informal actions by regulators or, often, no regulation at all. Your testimony makes clear that more formal procedures improve understanding and acceptance by all parties and establish regulatory consistency. Are you able to give the Committee an example of where a formal rulemaking would have been the preferred approach instead of a more informal action by the NRC?

Response. I firmly believe that new requirements should be imposed on licensees through formal rulemaking, rather than through generic letters, regulatory issue summaries, and information notices. As Mr. Lochbaum's testimony indicates, those mechanisms provide a way for the NRC to communicate practical information to licensees but are too often used by NRC to impose new requirements without adequate stakeholder input.

As an example I note that in 2005, the NRC issued Regulatory Issue Summary (RIS) 2005–05 regarding criticality control in spent nuclear fuel pools during cask loading operations. Prior to issuance of the RIS, spent fuel cask loading operations were understood by the industry to be governed by the requirements of 10 CFR Part 72. The RIS cited differences between the licensing basis for casks approved by the NRC in accordance with the provisions of 10 CFR Part 72 and the licensing basis for the spent fuel pools licensed in accordance with the provisions of 10 CFR Part 50. Specifically, Part 72 requires credit for soluble boron in the cask to maintain the spent fuel subcritical during cask loading operations performed in the spent fuel pool. Part 50, however, requires licensees to demonstrate by analysis that the spent fuel will remain subcritical in the spent fuel pool without credit for soluble boron. Both methods have been previously determined by the NRC to preclude an inadvertent criticality event in the spent fuel pool during cask loading operations. In essence, the RIS documented differing opinions within the agency for preventing an inadvertent criticality event and highlighted the need for rulemaking to specify the applicable requirements for cask loading activities. That is, rulemaking was needed to specify whether movement of spent fuel into a spent fuel cask represented an activity governed by the requirements of 10 CFR Part 72 or an activity governed by the requirements of 10 CFR Part 50. Instead, the RIS stated the requirements of both 10 CFR Part 50 and 10 CFR Part 72 were applicable and required licensees to obtain a license amendment to the Part 50 license. This is an example where an RIS was used to impose additional requirements on Part 50 licensees (i.e., a license amendment) that could have been avoided had timely rulemaking been initiated by the NRC. Rulemaking is currently being considered by the NRC to eliminate the

overlapping requirements of 10 CFR Part 50 and 10 CFR Part 72. Issuance of the RIS resulted in an unnecessary regulatory burden on licensees that did not result in a commensurate increase in public health and safety. We believe that NRC should use formal rulemaking or licensing process to effect such changes.

Question 2. In your statement, you say that, during NRC consideration of a new plant operating license, safety issues related to reactor design and environmental issues related to an early site permit should not be subject to re-review or litigation. How would you propose that the NRC restrict such review? Do you believe new regulations or a change in the law are required?

Response. At the outset, I want to emphasize that my statement is not directed to issues that have been rejected by the NRC as having not been properly raised in a licensing proceeding. Instead it is to address issues, such as environmental issues, that were resolved in one phase of the licensing process by way of a full hearing.

The NRC's current licensing process should adequately limit the reconsideration of issues that were fully heard and resolved at an earlier stage in the licensing process. If implemented consistently and efficiently, that process is sufficient and no new regulation or change in law would be necessary. Several of the proposed revisions to the NRC regulations could, however, undermine the finality that is currently envisioned and should be rejected for that reason.

STATEMENT OF DAVID A. LOCHBAUM, DIRECTOR, NUCLEAR SAFETY PROJECT

Mr. Chairman and members of the subcommittee, on behalf of the Union of Concerned Scientists, I thank you for this opportunity to present our views on the regulatory processes for existing and potentially new nuclear powerplants.

My name is David Lochbaum. After obtaining a degree in nuclear engineering from The University of Tennessee in 1979, I worked more than 17 years in the nuclear power industry, mostly at operating reactors in Georgia, Alabama, Mississippi, Kansas, New Jersey, Pennsylvania, New York, Ohio and Connecticut. I joined the Union of Concerned Scientists in October 1996 and am the Director of the Nuclear Safety Project. Since nearly its beginnings in May 1969, UCS has maintained an interest in nuclear powerplant safety. UCS is neither an opponent nor a supporter of nuclear power—our interest is that of a nuclear safety advocate.

In a prior oversight hearing, Chairman Voinovich impressed upon the Nuclear Regulatory Commission the need to improve its processes for assessing safety culture at nuclear powerplants. The NRC got the message and undertook a series of public meetings with internal and external stakeholders to develop methods to regulate safety culture that will be implemented in the near future. I participated in the public meetings conducted by the NRC and sincerely believe the proposed revisions will provide effective regulatory assessment of safety culture. Chairman Voinovich and this Subcommittee deserve credit for calling the NRC's attention to the safety culture gap in its regulatory processes. Likewise, the NRC deserves credit for avoiding the temptation of merely applying a band-aid to the gap and instead devoting the resources needed to prepare an effective permanent fix. (Attachment 1 provides a fuller explanation of our position on the NRC's revised safety culture processes.)

The safety culture gap had significant safety and economic consequences. The March 2002 discovery of serious degradation to the reactor vessel head at the Davis-Besse nuclear plant in Ohio has been attributed to its owner having placed production ahead of safety. Ten years ago, both reactors currently operating at the Millstone nuclear plant in Connecticut began long outages to restore margins caused by its owner having an improper safety focus. Nearly twenty years ago, both operating reactors at the Peach Bottom nuclear plant in Pennsylvania began long outages to restore margins also caused by its owner having an improper safety focus. While no one died from any of these events, operation of the reactors in the months and years prior to discovery of their extensive safety impairments exposed nearby communities to unnecessarily elevated risks. In addition, allowing the safety impairments to grow to epidemic levels resulted in unnecessarily high restoration costs to ratepayers and stockholders.

The revised regulatory processes soon to be adopted by the NRC have great potential. But even if that potential is fully realized, future safety impairments like those that afflicted Peach Bottom, Millstone and Davis-Besse will likely continue to occur at existing—or new—nuclear powerplants unless two other steps are taken. One step should be relatively easy for the NRC to take. It merely involves expanding the scope of its generic communications program to include safety culture issues. The NRC's generic communications program uses an array of communication documents (e.g., Regulatory Issue Summaries, Information Notices, Generic Letters, and

Bulletins) to help its licensees learn lessons from safety problems experienced here and abroad. Upon receiving generic communications from the NRC, owners incorporate applicable lessons into training programs and procedures at their plants. Literally thousands of generic communications issued over the past four decades are posted on the NRC's website at *http://www.nrc.gov/reading-rm/doc-collections/gen-comm/*. A small handful of these numerous generic communications deal with safety culture problems. For example, the NRC issued Information Notice 2002–11 (available online at *http://www.nrc.govireadin2-rmidoccollections/gen-comm/infonotices/2002/in02011.html)* to alert plant owners to the reactor vessel head degradation found at Davis-Besse. The NRC never issued a single generic communication document about the determination that production had been placed ahead of safety at Davis-Besse, even though it caused the extensive reactor vessel head degradation and several other equipment problems. The NRC must issue generic communications when safety culture problems are identified so that other plant owners can incorporate applicable lessons into their training programs and procedures like they do for equipment related problems.

The other step the NRC needs to take requires more effort. I recently completed an assessment of the times when nuclear power reactors had to shut down for a year or longer to restore safety levels. My research focused on the causes of these year-plus outages. The NRC's current regulatory processes were then back-tested against the outages causes. My work, which will be documented in a report issued by UCS in the near future and respectfully submitted to this subcommittee at that time, concluded that the leading cause for year-plus reactor outages remains ineffectively regulated today. More than 70 percent of the year-plus outages at U.S. nuclear power reactors over the past four decades have been caused by quality assurance program breakdowns. The NRC's regulations[1] require plant owners to have effective quality assurance programs that find and fix problems in a timely and effective manner. But time and again, those quality assurance programs utterly failed and the NRC did not detect the breakdowns until the sheer volume of problems missed or inadequately repaired eroded safety levels so far that the reactors remained shut down for longer than a year while overdue corrective actions were finally taken.

The NRC's ineffective enforcement of its quality assurance regulations at Davis-Besse illustrates the problem. In March 2001, the NRC informed Davis-Besse's owner that its inspection team "concluded that problems were properly identified, evaluated, and resolved within the problem identification and resolution programs."[2] Problem identification and resolution programs are the current nuclear industry terminology for quality assurance programs. Less than a year later, extensive degradation to the reactor vessel head was identified at Davis-Besse. In August 2002, the NRC identified a long list of tasks to be completed before it would permit Davis-Besse to restart.[3] The first item listed by the NRC in a section titled "Adequacy of Safety Significant Programs" was "Corrective Action Program," the very same program determined by the NRC to be fully adequate in March 2001. The NRC's 2001 determination was completely erroneous. The quality assurance program did not conform to federal regulations in March 2001 or for several years prior to that date. The NRC failure to enforce its quality assurance regulations contributed to the depth and breadth of the problems plaguing Davis-Besse.

Nothing in the past 5 years leads us to suspect, yet alone believe, that the NRC's process for evaluating whether its quality assurance regulations are being followed is any more effective today. The recurring tritium spills at the Braidwood nuclear plant in Illinois and the recurring steam dryer damage at the Quad Cities nuclear plant in Illinois share a common cause—defective, pitiful quality assurance. The NRC's vision impairment to quality assurance program failures continues.

The NRC, or actually the NRC's predecessor the Atomic Energy Commission, promulgated its quality assurance regulations in June 1970.[4] Embarrassing quality assurance breakdowns at many nuclear powerplants such as Zimmer in Ohio and Mid-

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[1] 10 CFR 50, Appendix B, "Quality assurance criteria for nuclear powerplants and fuel reprocessing plants." Available online at http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-appb.html.

[2] Kozak, T. J. 2001. Davis-Besse nuclear power station NRC inspection report no. 50–346/01–05(DRP). Letter to Guy G. Campbell, vice president, nuclear, FirstEnergy Nuclear Operating Company, March 27. Thomas J. Kozak is chief, projects branch 4, division of reactor projects at the Nuclear Regulatory Commission.

[3] Dyer, J. E. 2002. Transmittal of NRC inspection manual chapter 0350 panel restart checklist. Letter to Lew Myers, chief operating officer, FirstEnergy Nuclear Operating Company, August 16. James E. Dyer is regional administrator at the Nuclear Regulatory Commission.

[4] Atomic Energy Commission, 1970. Quality assurance criteria for nuclear powerplants. Federal Register (Vol. 35, No. 125, pp. 10498–10501), June 27. Washington, DC.

land in Michigan prompted the NRC and the nuclear industry to adopt the terminology "corrective action programs" in the late 1980s to get away from the stigma that had become linked with "quality assurance programs" at nuclear plants. Embarrassing corrective action program breakdowns at many nuclear powerplants such as Sequoyah and Watts Bar in Tennessee, Browns Ferry in Alabama, Indian Point in New York, and Millstone in Connecticut prompted the NRC and the nuclear industry to swap to "problem identification and resolution programs" in the late 1990s to once again avoid a stigma. Unless the NRC effectively enforces its quality assurance regulations, another stigma evasion swap will be needed towards the end of this decade because of embarrassing problem identification and resolution breakdowns at nuclear powerplants such as Davis-Besse, Salem and Hope Creek in New Jersey, Palo Verde in Arizona, and Braidwood and Quad Cities in Illinois. The NRC must consistently and effectively enforce its quality assurance regulations to avoid chronic erosion of safety levels that have led to dozens of year-plus reactor outages and which could someday factor in a tragic nuclear plant accident.

This second step requires greater effort by the NRC than the first step of expanding the scope of its generic communications program to include warnings about safety culture problems. But my research into year-plus reactor outages leaves me confident that the NRC can rise to the challenge. Year-plus reactor outages caused by events (e.g., the 1966 partial meltdown at Fermi Unit 1 in Michigan and the 1975 fire at Browns Ferry Units 1 and 2 in Alabama) and by damage to large components (e.g., the steam generator repairs at Turkey Point Unit 3 in Florida in 1981 and at Maine Yankee in Maine in 1995 and the piping replacements at Nine Mile Point Unit 1 in New York in 1982 and Pilgrim in Massachusetts in 1983) have essentially been eliminated due to successful regulatory actions by the NRC. There has not been a year-plus reactor outage caused by an event or damage to a large component in over a decade. But there have been 11 year-plus reactor outages caused by quality assurance program breakdowns in the past decade. Based upon the findings from my research, it is my firm conviction that year-plus reactor outages caused by quality assurance program breakdowns could be significantly reduced—if not outright eliminated—by proper regulatory attention from the NRC.

In closing, thanks largely to this subcommittee and its chairman, the NRC is about to implement revisions to its regulatory processes that should significantly reduce safety culture problems at nuclear powerplants. The NRC needs to complement those changes by expanding the scope of its generic communications program to include safety culture problems when they are identified. And the NRC needs to supplement these measures by regulatory process changes that enable the agency to consistently and effectively enforce its quality assurance regulations.

On behalf of the Union of Concerned Scientists, I thank you for conducting this hearing and for including our perspective.

Attachment 1

Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

December 8, 2005

The Honorable George V. Voinovich, Chairman
Subcommittee on Clean Air, Climate Change, and Nuclear Safety
Committee on Environment and Public Works
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

During the oversight hearing conducted by the Subcommittee on May 20, 2004, you took the Nuclear Regulatory Commission to task for not doing enough to address the safety culture issues that factored in the problems at the Davis-Besse nuclear plant. You were right: the forty-nine recommendations from the agency's Lessons Learned Task Force dealt with symptoms arising from safety culture problems without squarely addressing their root cause.

It was apparent the NRC heard your message and sincerely wanted to take meaningful steps to better protect against safety margin erosion caused by safety culture problems. Until recently, it was not apparent the agency would successfully translate those desires into deeds. But I attended a two-day public meeting the NRC conducted on November 29-30, 2005, and came away with strong conviction they have charted a course that will provide vastly improved oversight for this important area without imposing undue burden on plant owners.

The NRC's roadmap does not feature the agency engaging on safety culture at nuclear plant sites where performance levels are judged acceptable but has the agency engaging when performance declines are detected to discern whether safety culture is a factor. This is the most viable framework for regulatory oversight of safety culture. Engaging on safety culture earlier runs the risk of pulling regulatory resources and focus away from the detection of performance declines. In addition, earlier engagement penalizes plant owners who are achieving strong performance by unwarranted regulatory encroachment into day to day business operations. And finally, earlier engagement would unnecessarily duplicate steps undertaken by the industry in the wake of Davis-Besse. An industry task force working through the Institute for Nuclear Power Operations developed guidance to help plant owners better avoid safety culture problems. The NRC's roadmap credits this industry initiative while retaining regulatory oversight should any owner be unsuccessful in implementing the INPO guidance.

Should a performance decline be detected, the NRC's roadmap will not have the agency go out and evaluate the management structure and practices against some pre-approved template. Instead, the NRC will formally ask the plant owner if safety culture played a role in the decline and will independently evaluate the response. The plant owner retains flexibility to conduct a self-assessment or arrange for an independent evaluation in answering the NRC's inquiry.

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Should a plant owner determine that safety culture was a factor in a performance decline, the NRC's roadmap will not have the agency require that the owner adopt the Davis-Besse model or the Millstone model or any other pre-approved safety culture "kit." Instead, the NRC will formally require the plant owner to submit its plan for resolving the problems within a reasonable time frame. After the plan is completed, NRC inspectors will independently assess whether the corrective measures adequately resolved the problems.

The NRC is working very hard to be able to report more progress than promises to you at next year's oversight hearing. A necessary barrier to being able to complete all the steps before the hearing are the checks and balances built into the NRC's reactor oversight process (ROP). The ROP is recognized to be a constantly evolving tool, but there are formal processes in place to guard against the steps taken to correct problem A inadvertently creating problems B and C. The NRC will likely have identified all the steps needed to handle safety culture within the ROP before next year's hearing, but will probably be unable to have shepherded them all through the checks and balances needed to have fully implemented the steps.

On behalf of the Union of Concerned Scientists, I want to express our appreciation for the key role you played in getting the NRC to squarely address safety culture. It appears likely the agency will have a success story to relay at next year's oversight hearing.

Sincerely,

David Lochbaum
Nuclear Safety Engineer

RESPONSES BY DAVID A. LOCHBAUM TO ADDITIONAL QUESTIONS FROM SENATOR VOINOVICH

Question 1. Mr. Lochbaum, the information NRC provides on its website is very technical, hard to understand, and hard to find. However, this communication is imperative if the public is to have confidence in NRC's oversight of nuclear powerplants. I am interested in your views on the degree to which the public understands all of the information that is available related to the ROP and plant safety performance. Do you have any suggestions for how the NRC can improve this vital communication?

The NRC's website contains a wealth of information about the Reactor Oversight Process (ROP). The bountiful information includes a brochure about the ROP intended for a broad, general audience (available online at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1649/r3/sr1649r3.pdf), procedures used by NRC inspections in assessing plant performance, and results from those NRC inspections. The challenge facing the public is wading through this information pool. The ROP information is presently posted on the NRC website in an illogical and baffling manner. For example, it took me several minutes to locate the aforementioned brochure even though I knew it existed and access the NRC's ROP webpage on a weekly basis. One has to be an ROP expert to decipher they nukespeak and navigate the NRC's ROP webpage. That's too much of a burden for the NRC to place on any member of the public who merely seeks information about the performance of the reactor in his or her backyard.

The NRC's ROP webpage needs major redesigning. In our view, the ROP webpage should start with the Action Matrix Summary (see response to Question 2) because it provides the current status of what the NRC thinks about the performance of operating reactors. It provides the public with a straight-forward guide to the reactors performing well and the reactors getting increased attention from the NRC. From this overview, members of the public should then be able to drill down through additional ROP information to find details about why the NRC thinks a reactor is doing well (or not) and material about the ROP itself.

One class of documents conspicuously missing from the NRC's ROP webpage are the slides used by the NRC during its annual public meetings in each reactor community. The NRC has truly done a very fine job of communicating to the public attending these annual meetings about its assessment of the nearby reactor's performance. The NRC's slides convey reactor results in context and also provide very useful information about the level of effort (e.g., person-hours expended on inspections and breadth of areas inspected) used by the NRC in reaching its conclusions. Currently, the value of this commendable communications vehicle is limited to those persons attending the annual meetings and those persons stumbling across the documents in the NRC's online electronic library (ADAMS). These presentation slides should also be available from the NRC's redesigned ROP webpage.

Question 2. From your perspective, what has improved from NRC's old oversight and the newer Reactor Oversight Process in use today. NRC's prior oversight used the "watch list" to indicate which plants were poor performers. From your indepth look at the ROP, what distinguishes the good performers from the bad performers?

Response. The NRC's Reactor Oversight Process (ROP) is better than its previous process in many ways. I consider the most significant improvements to be in the areas of timeliness (current process updates plant performance measures on a quarterly basis instead of the former 18 to 24 month frequency), discreteness (current process examines performance in approximately 25 categories instead of the former 4 broad categories), and defined regulatory responses (graduated dependent upon the extent of the performance decline instead of the former ad hoc, case-by-case response). Collectively, these improvements should enable the NRC to detect performance declines sooner and engage so as to turn around declining trends before they droop to epidemic proportions.

The most visible measure for the NRC's determinations about good and bad performers is the Action Matrix Summary. This summary is available online at the NRC's website at http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/actionmatrix—summary.html. The Action Matrix Summary is updated by the NRC on a quarterly basis and shows the agency's overall assessments for each of the operating nuclear power reactors. The ratings are presented in tabular format. Reactors are placed into five columns, with the good performers in the first column (Licensee Response Column) and progressively underperforming reactors in the second through fifth column (Unacceptable Performance Column). At present, the overwhelming majority of reactors are in the first column. No reactors are in the fifth column and three reactors (Perry and Point Beach Units 1 and 2) are in the fourth column. Each reactor

not in the first column has a footnote explaining when and how the NRC determined its performance decline.

Complementing the Action Matrix Summary are two online charts showing the Performance Indicator (PI) and NRC inspection finding results for operating reactors. The PI chart is at http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/pi—summary.html and the inspection finding chart is at http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/pim—summary.html. These charts allow individuals to put results for a single reactor into context. This context supports the Action Matrix Summary in distinguishing between good and bad performers. The reactors with performance issues will have White, Yellow, and/or Red PI and/or inspection findings.

RESPONSE BY DAVID A. LOCHBAUM TO AN ADDITIONAL QUESTION FROM SENATOR JEFFORDS

Question. In your testimony you focus on the failure of quality assurance programs as the main reason for nuclear plant outages that lasted longer than one year. Can you please elaborate on how these problems have led to safety issues? Can the NRC address this problem by simply enforcing its existing regulations?

Response. The 2-year-plus outage at Davis-Besse illustrates how quality assurance program breakdowns have led to safety issues. The many other year-plus outages have similar histories. The most notorious problem at Davis-Besse was the degradation to the reactor vessel head discovered in March 2002. Had that problem been the only safety issue, Davis-Besse could have restarted in fall of 2002 after the damaged reactor vessel head was replaced with one acquired from the cancelled Midland nuclear plant. But Davis-Besse did not restart until March 2004 because many other safety issues were also uncovered. For example, the high pressure injection (HPI) pumps had a design flaw that likely would have caused them to fail shortly after being called upon to mitigate an accident. The flaw had been identified and corrected in French nuclear plants more than 10 years earlier, but Davis-Besse had not corrected this known deficiency. In addition, Davis-Besse's restart was delayed by repairs to peeling paint on the inner surface of the containment dome (not merely a cosmetic problem, the paint peels could have clogged the inlets to safety pumps during an emergency, preventing them from adequately cooling the reactor), to the containment air coolers damaged by boric acid, and to undersized screens protecting safety pumps from debris created by the hydrodynamic forces occurring during an accident. Each of these safety issues had been detected long before March 2002 and had either not been addressed or had been inadequately corrected. Consequently, the collection of unresolved safety issues grew larger with time, decreasing safety levels over that period and increasing the cost of repairs once the collection could no longer be tolerated. Had the NRC enforced its quality assurance regulations, these safety issues would have been resolved long ago, protecting the public from unnecessary erosion of safety margins and perhaps avoiding the high cost of a 2-year-plus safety restoration outage.

UCS is confident that the NRC can reduce, if not eliminate, the chronic year-plus outage problem plaguing the nuclear industry by enforcing its quality assurance regulations. It merely requires the agency to refocus how it handles NRC inspection findings. Each time an NRC inspector finds a safety problem, two separate issues are identified. The first issue is the specific finding—a broken widget, a failure of a worker to follow approved procedures, a failure to perform a surveillance test within the prescribed interval, etc. The second issue involves the quality assurance problem breakdown. In theory, NRC inspectors should never find anything because the plant owner's quality assurance measures should have already identified such problems. So each NRC inspection finding represents an implicit failure of the quality assurance effort at that site. But the NRC essentially ignores the quality assurance breakdown component of its inspection findings, thus closing its eyes to the systemic problems that led to the year-plus outages at Davis-Besse, Millstone, DC Cook, Salem, and so many other reactors. More importantly, the NRC's regulatory blindness to these identified quality assurance failures exposed persons living around these reactors to unnecessarily elevated risks during the months and years the reactors operated with numerous safety deficiencies. The good news is that the NRC can fix this problem by enforcing its existing quality assurance regulations.

STATEMENT OF KEVIN BOOK, SENIOR ANALYST, VICE PRESIDENT, FRIEDMAN, BILLINGS RAMSEY & COMPANY, INC.

I would like to thank Chairman Voinovich, Ranking Member Carper and all of the distinguished members of this Ssbcommittee for the honor of being invited to

contribute to the important work you are doing here today. The views I will express are my own and do not represent the viewpoint of my employer, the Arlington, Virginia-based investment bank Friedman, Billings, Ramsey & Company, Inc.

Let me begin by offering my admiration for the Members of this subcommittee and the foregoing panel of Nuclear Regulatory Commissioners. Oversight of the Nation's nuclear power industry requires an impressive breadth of financial, legal and technological knowledge.

My comparatively modest task is to serve the men and women who manage institutional assets on Wall Street. Like you and the Commissioners, they are busy and committed professionals who bring a wide range of skills and expertise to their also-critical roles in stewardship of the nation's economy. To the best of my ability, I provide these institutional investors with my interpretation of the energy policy actions taken here in Washington.

Put another way, I analyze the busy people here in Washington for the busy people on Wall Street. Today, it will be my privilege to turn the process around and offer my assessment of institutional investors' attitudes towards the current nuclear regulatory environment.

THE INVESTMENT DECISION

Financial investors seek returns that outperform industry benchmarks. An investor's charter or institutional mandate may define the class and type of portfolio assets in which he or she might invest. These choices may vary considerably across different firms, funds and asset classes but, whatever the criteria, timeframe or "style" involved, investors generally seek to allocate the capital entrusted to their care to the highest-yielding investments among competing alternatives.

Asset managers and corporate executives within energy and utility companies face similar challenges when considering energy investments. Energy projects usually require years of development once the investment decision has been taken, but the price of a given commodity may change abruptly (and often) within the sustained time period required before cash flows begin. Furthermore, demand for a given commodity can also change, potentially transforming an attractive profit opportunity into a financial loss, sometimes as a result of unforeseen developments.

The debt and equity markets incorporate a measure of the risks inherent to any individual utility or energy firm that might undertake a new nuclear power facility into that firm's "weighted average cost of capital", taking into account both the rate of return a firm must offer its debt holders and the cost to the firm of issuing new equity. It is usually more expensive for firms of any kind to undertake higher-risk projects or for higher-risk firms to issue equity or debt to fund the same type of projects routinely undertaken by lower-risk firms. From the investor's point of view, riskier investments must pay higher returns to be worth considering alongside less risky investments.

Financial investors may also modify expected project returns by multiplying projected future revenues by a coefficient that encapsulates the probability of a successful project or project stage, using this "expected value" in their risk-adjusted return calculations. Modeling project and securities values requires investors to make subjective assumptions about future conditions using all available information. This can explain the discrepancy in analysts' estimates for different securities. At the same time, investors may show enthusiasm for firms with strategic advantages vis-a-vis their competitors or for industries characterized by the prospect of rapid earnings growth. Likewise, investors may be highly sensitive to the prospect of a significant change in time prior to project completion. Lack of visibility into future regulatory or political circumstances or other key externalities may reduce investors' perceptions of the future value of a given firm's securities.

In the end, investors do not refuse to purchase riskier securities. Rather, the aggregated capital markets demand higher returns to mitigate the effects of higher associated risks. The capital budgeting process can result in firms (or investors) pursuing other options when Wall Street demands a higher rate of return than firms undertaking new projects can afford to pay (or choose to pay given the returns they expect to receive from the underlying project). For many years, a combination of these dynamics has driven capital away from new nuclear power facilities and towards other forms of power generation.

THE OPPORTUNITY AHEAD

The Nation's 103 nuclear powerplants currently provide approximately 20 percent of U.S. electricity and a total capacity approaching 98,000 MWt. With EIA projections of electricity demand growth through 2025 of 1.5 percent per annum, new nuclear powerplant construction will be necessary to retain at least a proportional role

for nuclear power in the Nation's future power needs. (A May 15, 2006 letter from Chairman Diaz to this subcommittee's leadership projected 3,795 MWt of power uprates at 23 nuclear powerplant units over the next 5 years, implying new capacity creation of at least 40,000 MWt to retain a fixed 20 percent role within the generating portfolio).

This represents a significant change. Since the Three-Mile-Island accident in 1979, the combination of potentially long delays associated with new reactor permits, high up-front capital costs, unclear regulatory risk horizons and once-cheaper natural gas-fired generation has deterred new nuclear reactor construction. On the other hand, the Energy Policy Act of 2005[1] created several meaningful incentives for new plant construction:

• Section 602 of the Act reauthorizes the Price-Anderson Act through December 31, 2025, limiting the financial risk to operators in the untoward event of a reactor accident.

• Section 638 of the Act offers the Secretary of Energy authority to enter into contracts to provide "standby support" to new powerplant sponsors totaling up $500 million (for the first two plants) to offset capital costs associated with certain delays during Nuclear Regulatory Commission approval, Congressional oversight and judicial review or litigation.

• Section 1306 of the Act creates an 8-year, 1.8-cent per kilowatt hour production tax credit for new advanced nuclear power facilities subject to certain capacity limits.

• Section 1703 of the Act includes advanced nuclear power facilities as eligible projects for federal loan guarantees for 80 percent of project cost.

In addition, the Energy Policy Act of 1992 overhauled the licensing process to create the combined Construction and Operating License (COL) in place today under 10 CFR 52.

TWO POTENTIAL OUTSTANDING ISSUES

Using EIA's projected[2] capital costs of $2,014/kW, a 1,000 MWt new nuclear plant would be a $2 billion undertaking that will require project sponsors to source capital from the debt and equity markets. The capital structure of any prospective transaction would likely reflect the character of the project sponsor itself Merchant generators might structure more debt-leveraged transactions to take advantage of the lower cost of capital associated with federal loan guarantees under Section 1703 of the Act (thereby minimizing the dilutive effects of new equity issues) while regulated utilities might set 50:50 debt-to-equity project capital structures in order to expand their equity rate bases.

Irrespective of capital structure, it may not become clear until after advanced nuclear plant applications have been formally submitted and the capital raising process has begun whether incentives will be enough to generate investor enthusiasm at financial terms that meet the constraints of the project sponsors.

It is my view, based on conversations with clients and colleagues, that the current policy framework leaves two issues outstanding that could potentially result in investors assigning greater risk premiums to new offerings in support of advanced reactor construction.

The first of these is the potential for delay. In any discounted cash flow analysis, of project (or securities) valuation, time is a critical factor. Because a dollar next year is worth less than a dollar today, longer project delays even at a low cost of capital will diminish cash-on-cash returns. The effect is not just limited to the cash flows available to equity shareholders; the prospect of execution risk in tandem with significant financial leverage could potentially erode a project sponsor's creditworthiness.

The legislated incentives for new plant construction suggest a favorable economic result for an on-time completion scenario: the first plants in service will be eligible to receive production tax credits of 1.8 cents per kilowatt hour—a potential boost worth 20 percent (or far more) of average retail price for electricity produced[3]. The problem is that project sponsors cannot capture this economic benefit until the plants go into operation (and only if operation commences before December 31, 2020). Because new reactors will provide the first test of the combined COL process, investors are likely to consider the unlikely prospect than an unexpectedly long

[1] http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109—cong—public—laws&docid=f:pub1058.109.

[2] 2006 EIA Annual Energy Outlook. Table 38, p. 77.

[3] Again, using EIA numbers. At an average retail price of 7.62 cents per kilowatt hour across all sectors and all users for most recent data available, 1.8 cents would represent 23.6 percent of end-user retail price. See website at http://www.eia.doe.gov/cneaf/electricity/epa/epat7p4.html.

delay might outstrip even the $500 million offset provided under section 638 (a consideration that becomes much more relevant for plants 3–6, where the offset is only $250 million, or plants 7+, for which no offset is provided). Nuclear Regulatory Commission reviews of the operators' inspections, tests, analyses and acceptance criteria may also contribute unpredictable delays to the final stage of the process. Regulated utilities might be able to recoup unforeseen costs associated with delays through rate-base proceedings, but competitive pressure could force merchant generators to offer power at prices closer to prevailing competitive levels, creating the prospect for diminished project returns.

The second area outstanding issue is waste storage. Unanticipated additional capital expenditures by project sponsors to construct waste storage could also negatively affect project returns. According to the testimony of Paul Golan, the Acting Director of the Department of Energy's Office of Civilian Radioactive Waste Management, before the full U.S. Senate Environment and Public Works Committee on March 1, 2006, the nation's powerplants maintain more than 50,000 metric tons of nuclear waste at 122 temporary storage facilities in 39 states. Mr. Golan suggested during his March testimony that he hoped to publish a schedule this summer for the Department to submit its permit application for Yucca Mountain to the Nuclear Regulatory Commission.

While Yucca Mountain operations could conceivably begin before new nuclear reactors even go into operation (and therefore well before new nuclear waste would be ready for transportation from onsite facilities to geologic storage), institutional investors must also take into consideration the prospect that federally-provided permanent geologic disposal of nuclear waste may not become operational at Yucca Mountain or anywhere else, in the near-term, intermediate term or even at all. A recent newspaper article[4] projected that new storage at PG&E's Diablo Canyon facility could cost as much as $200 million. If project sponsors were to bear the costs of constructing storage facilities to accommodate waste from new reactors (in addition to the 2,000 incremental metric tons each year created by the existing fleet of reactors), the additional spending could also diminish expected project returns.

In closing, it is my view that the capital markets will most efficiently support the policy goal of expanding low-emissions, high-capacity electricity generation through the construction of new nuclear powerplants when institutional investors face minimum risks associated with regulatory delay and waste storage costs.

This concludes my prepared testimony.

RESPONSES BY KEVIN BOOK TO ADDITIONAL QUESTIONS FROM SENATOR VOINOVICH

Question 1. Mr. Book, I am interested in the investment community's scrutiny of the NRC in their oversight of the current fleet of plants. Do delays today in terms of a license extension (or power uprating) for a plant or how the Commission handles an issue at a specific plant play a role in financing the construction of new plants?

Response. Chairman Voinovich, it is my belief that approval delays for license extensions or power upratings today may not necessarily affect the specific financial characteristics of a given nuclear powerplant sponsor at a future date unless that sponsor is unable to generate cash flows sufficient to service the leverage (or equity dilution) incurred as a result of those undertakings.

However, investors in new nuclear powerplants will have very little information with which to set their expectations as they calculate financial returns under different delivery scenarios. Sustained delays today could cause investors to assign a lower probability weighting for an on-time delivery scenario, lowering the risk-adjusted returns to equity holders on a per-share basis and ultimately increasing the cost of capital to the project sponsor.

The character of, and reason for, the delay would also play a role. Structural incapacity or bottlenecks at key administrative junctures might signal to an investor that future Nuclear Regulatory Commission decisions that incorporate the same staff or administrative processes could carry a higher risk of delay.

Question 2. I am very interested in your comments about the risk posed by delays. In terms of licensing a new plant, is there a point at which a delay is more significant than another? For example, if the first plant to go through this process has delays early is that significant or is it seen as just a learning process? Or is a delay in the process for a second plant worse than for the first?

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[4] Baker, D. "Waste storage dilemma crimps nuclear future." The San Francisco Chronicle. June 11, 2006.

Response. Chairman, the answer to your first question depends on how plant financing is structured. Under a scenario where project sponsors capitalize a new project through securities offerings at the beginning of the project life, any event that pushes back cash returns beyond the projected start date will diminish the expected rate of return.

To your second question, investors are likely to be forgiving of delays associated with early efforts, particularly as the industry itself has offered full disclosure of the human capital ramp-up they will face for new plant development and the anticipated challenges associated with new skills acquisition, retraining and experiential learning. These expectations should already be built into the financial forecasts of analysts and project sponsors alike.

In general, I believe regulatory delays that are neither anticipated nor ascribable to the steepest part of the learning curve are likely to have the most chilling effect on investor enthusiasm.

Qustion 3. Mr. Book, I am interested in how new nuclear plants compete with alternative energy sources such as coal, gas, hydro, wind, solar, biomass in meeting the demand for electricity?

Response. Chairman, the question you pose can be evaluated at many levels. In my published research, I rely on one of the most basic measures of comparative project economics, the "levelized generation cost", usually expressed on a cents-per-kilowatt-hour basis. Computing levelized generation cost requires one to make a number of assumptions about capital cost, plant life, fuel costs and construction timeframes.

Using the Energy Information Administration's own numbers provided within the 2005 Annual Energy Outlook, photovoltaic generation would represent one of the most expensive options at 21.0 cents/kW-h and solar thermal generation would weigh in at 12.0 cents/kW-h. Natural gas combined cycle and pulverized coal, on the other hand, reflect considerably cheaper production costs at 4.7 cents/kW-h and 4.3 cents/kW-h, respectively, but both of these build on assumptions of relatively stable base-case prices for fossil fuel inputs. Wind comes in at 4.8 cents/kW-h, open loop biomass at 5.1 cents/kW-h and nuclear power at 6.0 cents/kW-h, although existing production subsidies could yield adjusted generation costs of 3.9 cents/kW-h for wind, and 4.2 cents/kW-h for open-loop biomass and nuclear plants.

By the same token, these numbers do not account for the production scale of nuclear powerplants compared to other sources. The potential capacity provided by nuclear power (in the 1,000–2,000 MW range) far outstrips the capacity of most of the renewable sources and there are realistic limits that each of renewable sources would encounter in attaining that capacity (think of hillsides and prairies endlessly covered with wind turbines as far as the eye can see).

Likewise, these levelized generation assumptions do not consider the upward pressure that would be exerted on the nation's already-straitened natural gas resources if all that capacity had to come from new combined cycle plants—the resulting demand spike could conceivably make natural gas much more expensive than the current EIA base case suggests and skew the levelized generation numbers upwards.

Finally, the levelized generation metrics do not incorporate all of the potential costs of credits to offet nitrogen oxide, sulfur dioxide and mercury emissions from pulverized coal plants. These credits are subject to market-based price moves under the EPA's Clean Air Interstate and Mercury Rules. Furthermore, these numbers do not incorporate the potential cost associated with any future regulation governing carbon emissions from coal-fired powerplants.

It is my personal view that the relatively stable ongoing production costs of nuclear power make it an attractive base-load source for the expected 50 percent growth in U.S. electricity demand over the next 25 years. It likewise seems inevitable that coal-fired production will retain its prominent station as a source of base-load power within the Nation's generating portfolio, whereas the renewable and alternative sources you mentioned will likely continue to present utilities with the greatest value as "peaking" sources to offset maximum demand periods. Conservation, too, if it results from price-responsive behavior by U.S. consumers, may prove to be a useful (albeit necessarily finite) "source".

RESPONSE BY KEVIN BOOK TO AN ADDITIONAL QUESTION FROM SENATOR JEFFORDS

Question. You stated in your testimony that one of the main outstanding issues that might deter investors from investing in reactor construction projects is waste storage. As you also mentioned there are questions about if and when the Yucca Mountain repository will begin operation. There is also the question of the capacity

of Yucca Mountain being depleted by existing spent nuclear fuel. How are potential project sponsors responding to the uncertainties about waste storage?

Response. Ranking Member Jeffords, as I have not yet seen any debt or equity prospectuses offered to support new nuclear powerplant construction, I cannot speak to how any of the 18 potential applicants referenced during testimony on June 22, 2006 might respond on an individual basis.

On the other hand, I can anticipate three general categories of action available to project sponsors. First, sponsors might account for this uncertainty by factoring in the cost of constructing new onsite storage. Second, sponsors can project the costs of purchasing interim storage from a third-party provider. Third, sponsors can consider the "sunny day" case that federal government provided permanent storage will be provided in a timely fashion. By the same token, it would not be unreasonable for sponsors also to consider a "rainy day" outcome whereby new onsite or interim storage costs are higher than expected due to a growth in demand. In every case but the "sunny day" operation of a federal repository, the net effect of uncertainty appears to imply diminished expected returns from the new reactor project.

United States Government Accountability Office

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Testimony

Before the Subcommittee on Clean Air, Climate Change, and Nuclear Safety, Committee on Environment and Public Works, United States Senate

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NUCLEAR REGULATORY COMMISSION

Preliminary Observations on Its Oversight to Ensure the Safe Operation of Nuclear Power Plants

Statement for the Record by Jim Wells, Director
Natural Resources and Environment

GAO-06-886T

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Highlights

Highlights of GAO-06-886T, a statement for the record for the Subcommittee on Clean Air, Climate Change, and Nuclear Safety, Committee on Environment and Public Works, United States Senate

Why GAO Did This Study

The Nuclear Regulatory Commission (NRC) has the responsibility to provide oversight to ensure that the nation's 103 commercial nuclear power plants are operated safely. While the safety of these plants has always been important, since radioactive release could harm the public and the environment, NRC's oversight has become even more critical as the Congress and the nation consider the potential resurgence of nuclear power in helping to meet the nation's growing energy needs.

Prior to 2000, NRC was criticized for having a safety oversight process that was not always focused on the most important safety issues and in some cases, was overly subjective. To address these and other concerns, NRC implemented a new oversight process—the Reactor Oversight Process (ROP). NRC continues to modify the ROP to incorporate feedback from stakeholders and in response to other external events.

This statement summarizes information on (1) how NRC oversees nuclear power plants, (2) the results of the ROP over the past several years, and (3) the aspects of the ROP that need improvement and the status of NRC's efforts to improve them. This statement discusses preliminary results of GAO's work. GAO will report in full at a later date. GAO analyzed program-wide information, inspection results covering 5 years of ROP operations, and detailed findings from a sample of 11 plants.

www.gao.gov/cgi-bin/getrpt?GAO-06-886T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Jim Wells (202) 512-3841 or wellsj@gao.gov.

June 22, 2006

NUCLEAR REGULATORY COMMISSION

Preliminary Observations on Its Oversight to Ensure the Safe Operation of Nuclear Power Plants

What GAO Found

NRC uses various tools to oversee the safe operation of nuclear power plants, including physical plant inspections and quantitative measures or indicators of plant performance. To apply these tools, NRC uses a risk-informed and graded approach—that is, one considering safety significance in deciding on the equipment and operating procedures to be inspected and employing increasing levels of regulatory attention to plants based on the severity of identified performance problems. The tools include three types of inspections—baseline, supplemental, and special. All plants receive baseline inspections of plant operations almost continuously by NRC inspectors. When NRC becomes aware of a performance problem at a plant, it conducts supplemental inspections, which expand the scope of baseline inspections. NRC conducts special inspections to investigate specific safety incidents or events that are of particular interest to NRC because of their potential significance to safety. The plants also self-report on their safety performance using performance indicators for plant operations related to safety, such as the number of unplanned reactor shutdowns.

Since 2001, NRC's ROP has resulted in more than 4,000 inspection findings concerning nuclear power plant licensees' failure to comply with regulations or other safe operating procedures. About 97 percent of these findings were for actions or failures NRC considered important to correct but of low significance to overall safe operation of the plants. In contrast, 12 of the inspection findings, or less than 1 percent, were of the highest levels of significance to safety. On the basis of its findings and the performance indicators, NRC has subjected more than three-quarters of the 103 operating plants to oversight beyond the baseline inspections for varying amounts of time.

NRC has improved several key areas of the ROP, largely in response to independent reviews and feedback from stakeholders. These improvements include better focusing its inspections on those areas most important to safety, reducing the time needed to determine the risk significance of inspection findings, and modifying the way that some performance indicators are measured. NRC also recently undertook a major initiative to improve its ability to address plants' safety culture—that is, the organizational characteristics that ensure that issues affecting nuclear plant safety receive the attention their significance warrants. GAO and others have found this to be a significant shortcoming in the ROP. Although some industry officials have expressed concern that its changes could introduce undue subjectivity to NRC's oversight, given the difficulty in measuring these often intangible and complex concepts, other stakeholders believe its approach will provide NRC better tools to address safety culture issues at plants. NRC officials acknowledge that its effort is only a step in an incremental approach and that continual monitoring, improvements, and oversight will be needed to fully detect deteriorating safety conditions before an event occurs.

Mr. Chairman and Members of the Subcommittee:

I am pleased to have the opportunity to comment on our ongoing review of how the Nuclear Regulatory Commission (NRC) oversees the safe operation of the nation's 103 operating commercial nuclear power plants, which provide about 20 percent of U.S. electricity. The safety of these plants, which are located at 65 sites in 31 states, has always been important, as an accident could result in the release of radioactive material and potentially harm public health and the environment. NRC is responsible for issuing regulations, licensing and overseeing plants, and requiring necessary actions to protect public health and safety, while plant operators are responsible for safely operating their plants in accordance with their licenses. NRC's oversight has become even more critical as the Congress and the nation consider the potential resurgence of nuclear power in helping to meet the nation's growing energy needs. No new orders for a plant have been placed since the 1979 accident at the Three Mile Island plant, but in the face of concerns about aging plants, energy security, global warming, and the ever increasing need for energy to fuel the nation's economy, nuclear power is resurfacing as a principal option. An accident could threaten public confidence in nuclear power just as it begins to emerge from the shadows of the Three Mile Island accident. It is critical that NRC be able to ensure that nuclear power plants are operated safely and that public confidence about their safety is high.

Prior to 2000, NRC was criticized for having a safety oversight process that was not always focused on the most important safety issues and in some cases, regulatory activities were redundant, inefficient, and overly subjective. While its new process—which NRC refers to as the Reactor Oversight Process (ROP)—is similar to its prior process in that the oversight activities largely consist of physical plant inspections, the inspections now focus on more important safety issues and the goal is to make assessments of plants' safety performance more objective, predictable, and understandable. The unexpected discovery, in March 2002, of extensive corrosion and a pineapple-size hole in the reactor vessel head—a vital barrier preventing a radioactive release—at the Davis-Besse nuclear power plant in Ohio led NRC to re-examine its safety oversight and other regulatory processes to determine how such corrosion could be missed. Based on the lessons learned from the event, NRC made several changes to the ROP. NRC continues to annually assess the ROP by obtaining feedback from the industry and other stakeholders such as public interest groups, and incorporates this feedback and other information into specific performance metrics to assess its effectiveness.

We are preparing a report to you and other Members of the Congress later this year on (1) how NRC oversees nuclear power plants to ensure that they are operated safely, (2) the results of the ROP over the past several years in terms of the number and types of inspection findings, and (3) the aspects of the ROP that need improvement and the status of NRC's efforts to improve them.[1] To examine how NRC oversees plants, we reviewed NRC's regulations, inspection manuals, and other guidance documents; interviewed NRC headquarters and regional officials and regional and on-site inspectors; visited the Salem and Hope Creek nuclear power plants; and attended several public meetings covering various nuclear power plant oversight topics. To examine the results of the ROP over the past several years, we analyzed NRC data on nuclear plant safety for 2001 through 2005, the years since implementation of the ROP for which data were available for the full year, and discussed our analysis with NRC officials. We assessed the reliability of this data and determined that the data were sufficiently reliable for the purposes of our report. To examine areas of the ROP that need improvement and the status of NRC's efforts to improve them, we reviewed NRC documents, including annual self-assessment reports; interviewed officials from NRC and outside stakeholder groups; and attended several key public meetings covering proposed changes to oversight procedures. We also reviewed various external evaluations of the ROP, including our prior reports and those of the NRC Inspector General. Additionally, we selected a nonprobability sample of 6 nuclear power sites (totaling 11 plants) that provided coverage of each of NRC's four regional offices and varying levels of plant performance and NRC oversight since 2000. We reviewed relevant inspection reports and assessment documents and interviewed NRC and industry officials at each site to examine how NRC applies the ROP to identify and correct safety problems. We are conducting this work in accordance with generally accepted government auditing standards. We performed the work reflected in this statement from July 2005 to June 2006.

To date, our work indicates the following:

- NRC uses various tools to oversee the safe operation of nuclear power plants, including physical plant inspections of equipment and records and

[1]Physical security, which is also covered by the ROP, is not included in this review. For information on NRC's physical security, see GAO, *Nuclear Power Plants: Efforts Made to Upgrade Security, but the Nuclear Regulatory Commission's Design Basis Threat Process Should Be Improved*, GAO-06-388 (Washington, D.C.: Mar. 14, 2006).

quantitative measures or indicators of plant performance such as the number of unplanned shutdowns. NRC uses a graded and risk-informed approach—that is, one considering safety significance in deciding on the equipment or operating procedures to be inspected and employing increasing levels of regulatory attention to plants based on the severity of identified performance problems—to apply these tools. All plants receive baseline inspections, which are inspections of plant operations that are conducted almost continuously by NRC inspectors usually located at each nuclear power plant site. When NRC becomes aware of a performance problem at a plant, it conducts supplemental inspections, which expand the scope of baseline inspections. NRC conducts special inspections to investigate specific safety incidents or events that are of particular interest to NRC because of their potential significance to safety. The plants also self-report on their safety performance using performance measures or indicators in quarterly reports submitted to NRC. Plants' quarterly reports of performance indicators are verified by NRC's on-site inspectors. NRC analyzes each of its inspection findings to determine the finding's significance in terms of safety, and applies increasing levels of oversight based on the number and level of risk of the findings identified.

- Since 2001, NRC's ROP has resulted in more than 4,000 inspection findings concerning nuclear power plant licensees' failure to comply with regulations or other safe operating procedures. About 97 percent of these findings were for actions or failures NRC considered important to correct but of very low significance to overall safe operation of the plants. For example, a finding of very low risk significance was issued at one plant after a worker failed to wear the proper radiation detector and at another plant because the operator failed to properly evaluate and approve the storage of flammable materials in the vicinity of safety-related equipment. In contrast, 12 of the inspection findings, or less than 1 percent, were of the highest levels of significance to safety. For example, NRC issued a finding of the highest risk significance at one plant after a steam generator tube failed, causing an increased risk of the release of radioactive material. Similarly, there were 156 instances, or less than 1 percent, in which data reported for individual performance indicators were outside NRC's acceptable category of performance. On the basis of its findings and the performance indicators, NRC has subjected more than three-quarters of the 103 operating plants to oversight beyond the baseline inspections for varying amounts of time. Over the past 5 years, 5 plants have been subject to the highest level of NRC oversight that still allows continued operations. According to NRC officials, the results of its oversight process at an industry or summary level serve as an indicator of overall industry performance, which to date indicates good safety performance.

- NRC has improved several key areas of the ROP, largely in response to independent reviews and feedback from stakeholders, including its regional and on-site inspectors, usually obtained during NRC's annual self-assessment of the oversight process. These improvements include better focusing its inspections on those areas most important to safety, reducing the time needed to determine the risk significance of inspection findings, and modifying the way that some performance indicators are measured. For the most part, NRC considers these efforts to be refinements rather than significant changes. One significant shortcoming in the ROP that we and others have found is that it is not as effective as it could be in identifying and addressing early indications of deteriorating safety at nuclear power plants before problems develop. In response to this concern, NRC recently undertook a major initiative to improve its ability to address plants' safety culture—that is, the organizational characteristics that ensure that issues affecting nuclear plant safety receive the attention their significance warrants. NRC and others have long recognized that safety culture attributes, such as attention to detail, adherence to procedures, and effective corrective and preventative action, have a significant impact on a plant's safety performance. NRC is taking action to improve how it incorporates safety culture into the ROP by redefining and increasing its focus on more qualitative and cross-cutting issues or aspects of plant performance—including a safety conscious work environment, human performance, and problem identification and resolution—and developing new requirements to more directly assess safety culture at poorer performing plants. Some of its actions have been controversial. Although some industry officials have expressed concern that these changes could introduce undue subjectivity to NRC's oversight, given the difficulty in measuring these often intangible and complex concepts, other stakeholders believe this approach will provide NRC better tools to address safety culture issues at plants. NRC officials acknowledge that this effort is only a step in an incremental approach and that continual monitoring, improvements, and oversight will be needed to fully detect deteriorating safety conditions before an event occurs.

NRC is devoting considerable effort to overseeing the safe operation of the nation's commercial nuclear power plants, and its process for doing so appears logical and well-structured. This does not mean that NRC's oversight is perfect. However, NRC is also demonstrating that it is aware of this fact and is willing to make changes to improve. Its efforts to continuously obtain feedback and consider the need for improvement to the ROP are important as nuclear power plants age and the nation considers building new plants. In this regard, its safety culture initiative may be its most important improvement to the ROP. As we complete our work, we will be examining whether NRC needs a more formal mechanism

to assess the effectiveness of this initiative, including incorporating stakeholder feedback and developing specific measures to assess its performance. It has been more than 4 years since Davis-Besse, and it appears that NRC is now taking concrete actions to begin incorporating safety culture into the ROP.

I would also like to point out that the ROP is a very open process in that NRC provides the public and its other stakeholders with considerable specific and detailed information on its activities and findings with regard to safety at individual plants. However, to ensure or foster even greater public confidence in safety oversight, as we complete our work, we will be examining whether NRC can make this information more meaningful by providing industry-wide or summary data for key components of its oversight process. This information may provide a useful measure of overall industry performance and allow for comparisons between the safety performance of a specific plant to that of the industry as a whole.

Background

NRC is an independent agency of over 3,200 employees established by the Energy Reorganization Act of 1974 to regulate civilian—that is, commercial, industrial, academic, and medical—use of nuclear materials. NRC is headed by a five-member Commission. The President appoints the Commission members, who are confirmed by the Senate, and designates one of them to serve as Chairman and official spokesperson. The Commission as a whole formulates policies and regulations governing nuclear reactor and materials safety, issues orders to licensees, and adjudicates legal matters brought before it.

NRC and the licensees of nuclear power plants share the responsibility for ensuring that commercial nuclear power reactors are operated safely. NRC is responsible for issuing regulations, licensing and inspecting plants, and requiring action, as necessary, to protect public health and safety. Plant licensees have the primary responsibility for safely operating their plants in accordance with their licenses and NRC regulations. NRC has the authority to take actions, up to and including shutting down a plant, if licensing conditions are not being met and the plant poses an undue risk to public health and safety.

Nuclear power plants have many physical structures, systems, and components, and licensees have numerous activities under way, 24-hours a day, to ensure that plants operate safely. NRC relies on, among other things, its on-site resident inspectors to assess plant conditions and the licensees' quality assurance programs such as those required for

maintenance and problem identification and resolution. With its current resources, NRC can inspect only a relatively small sample of the numerous activities going on during complex plant operations. According to NRC, its focus on the more safety significant activities is made possible by the fact that safety performance at plants has improved as a result of more than 25 years of operating experience.

Commercial nuclear power plants are designed according to a "defense in depth" philosophy revolving around redundant, diverse, and reliable safety systems. For example, two or more key components are put in place so that if one fails, there is another to back it up. Plants have numerous built-in sensors to monitor important indicators such as water temperature and pressure. Plants also have physical barriers to contain the radiation and provide emergency protection. For example, the nuclear fuel is contained in a ceramic pellet to lock in the radioactive byproducts and then the fuel pellets are sealed inside rods made of special material designed to contain fission products, and the fuel rods are placed in reactors housed in containment buildings made of several feet of concrete and steel.

Furthermore, the nuclear power industry formed an organization, the Institute of Nuclear Power Operations (INPO) with the mission to "promote the highest levels of safety and reliability-to promote excellence-in the operation of nuclear electric generating plants." INPO provides a system of personnel training and qualification for all key positions at nuclear power plants and workers undergo both periodic training and assessment. INPO also conducts periodic evaluations of operating nuclear plants, focusing on plant safety and reliability, in the areas of operations, maintenance, engineering, radiological protection, chemistry, and training. Licensees make these evaluations available to the NRC for review, and the NRC staff uses the evaluations as a means to determine whether its oversight process has missed any performance issues.

NRC Uses Various Tools and Takes a Graded and Risk-Informed Approach to Ensuring the Safety of Nuclear Power Plants

NRC uses various tools to oversee the safe operation of nuclear power plants, generally consisting of physical plant inspections of equipment and records and objective indicators of plant performance. These tools are risk-informed in that they are focused on the issues considered most important to plant safety. Based on the results of the information it collects through these efforts, NRC takes a graded approach to its oversight, increasing the level of regulatory attention to plants based on the severity of identified performance issues. NRC bases its regulatory oversight process on the principle and requirement that plant licensees routinely identify and address performance issues without NRC's direct

involvement. An important aspect of NRC's inspections is ensuring the effectiveness of licensee quality assurance programs. NRC assesses overall plant performance and communicates these results to licensees on a semi-annual basis.

During fiscal year 2005, NRC inspectors spent a total of 411,490 hours on plant inspection activities (an average of 77 hours per week at each plant). The majority of these inspection efforts were spent on baseline inspections, which all plants receive on an almost continuous basis. Baseline inspections, which are mostly conducted by the two to three NRC inspectors located at each nuclear power plant site, evaluate the safety performance of plant operations and review plant effectiveness at identifying and resolving its safety problems.[2] There are more than 30 baseline inspection procedures, conducted at varying intervals, ranging from quarterly to triennially, and involving both physical observation of plant activities and reviews of plant reports and data. The inspection procedures are risk-informed to focus inspectors' efforts on the most important areas of plant safety in four ways: 1) areas of inspection are included in the set of baseline procedures based on, in part, their risk importance, 2) risk information is used to help determine the frequency and scope of inspections, 3) the selection of activities to inspect within each procedure is informed with plant-specific risk information, and 4) the inspectors are trained in the use of risk information in planning their inspections.

For inspection findings found to be more than minor,[3] NRC uses its significance determination process (SDP) to assign each finding one of four colors to reflect its risk significance.[4] Green findings equate to very low risk significance, while white, yellow, and red colors represent increasing levels of risk, respectively. Throughout its application of the SDP, NRC incorporates information from the licensee, and the licensee has the opportunity to formally appeal the final determination that is made.

[2]Certain baseline inspections may also be done by regional staff because of their expertise in particular aspects of plant operations.

[3]Minor issues are defined by NRC as those that have little actual safety consequences, little or no potential to impact safety, little impact on the regulatory process, and no willfulness.

[4]The SDP essentially evaluates how an inspection finding impacts the margin of safety of a plant. The impact is largely evaluated through the use of information on operating experience and risk estimates calculated using probabilistic risk assessment (PRA).

In addition to assigning each finding a color based on its risk significance, all findings are evaluated to determine if certain aspects of plant performance, referred to as cross-cutting issues, were a contributing cause to the performance problem. The cross-cutting issues are comprised of (1) problem identification and resolution, (2) human performance, and (3) safety consciousness in the work environment. To illustrate, in analyzing the failure of a valve to operate properly, NRC inspectors determined that the plant licensee had not followed the correct procedures when performing maintenance on the valve, and thus NRC concluded the finding was associated with the human performance cross-cutting area. If NRC determines that there are multiple findings during the 12-month assessment period with documented cross-cutting aspects, more than three findings with the same causal theme, and NRC has a concern about the licensee's progress in addressing these areas, it may determine that the licensee has a "substantive" cross-cutting issue. Opening a substantive cross-cutting issue serves as a way for NRC to notify the plant licensee that problems have been identified in one of the areas and that NRC will focus its inspection efforts in the cross-cutting area of concern.

When NRC becomes aware of one or more performance problems at a plant that are assigned a risk color greater-than-green (white, yellow, or red), it conducts supplemental inspections. Supplemental inspections, which are performed by regional staff, expand the scope beyond baseline inspection procedures and are designed to focus on diagnosing the cause of the specific performance deficiency. NRC increases the scope of its supplemental inspection procedures based on the number of greater-than-green findings identified, the area where the performance problem was identified, and the risk color assigned. For example, if one white finding is identified, NRC conducts a follow-up inspection directed at assessing the licensee's corrective actions to ensure they were sufficient in both correcting the specific problem identified and identifying and addressing the root and contributing causes to prevent recurrence of a similar problem. If multiple yellow findings or a single red finding is identified, NRC conducts a much more comprehensive inspection which includes obtaining information to determine whether continued operation of the plant is acceptable and whether additional regulatory actions are necessary to address declining plant performance. This type of more extensive inspection is usually conducted by a multi-disciplinary team of NRC inspectors and may take place over a period of several months. NRC inspectors assess the adequacy of the licensee's programs and processes such as those for identifying, evaluating, and correcting performance issues and the overall root and contributing causes of identified performance deficiencies.

NRC conducts special inspections when specific events occur at plants that are of particular interest to NRC because of their potential safety significance. Special inspections are conducted to determine the cause of the event and assess the licensee's response. For special inspections, a team of experts is formed and an inspection charter issued that describes the scope of the inspection efforts. At one plant we reviewed, for example, a special inspection was conducted to investigate the circumstances surrounding the discovery of leakage from a spent fuel storage pool. Among the objectives of this inspection were to assess the adequacy of the plant licensee's determination of the source and cause of the leak, the risk significance of the leakage, and the proposed strategies to mitigate leakage that had already occurred and repair the problem to prevent further leakage.

In addition to its various inspections, NRC also collects plant performance information through a performance indicator program, which it maintains in cooperation with the nuclear power industry. On a quarterly basis, each plant submits data for 15 separate performance indicators. These objective numeric measures of plant operations are designed to measure plant performance related to safety in various aspects of plant operations. For example, one indicator measures the number of unplanned reactor shutdowns during the previous four quarters while another measures the capability of alert and notification system sirens, which notify residents living near the plant in the event of an accident. Working with the nuclear power industry, NRC established specific criteria for acceptable performance with thresholds set and assigned colors to reflect increasing risk according to established safety margins for each of the indicators. Green indicators reflect performance within the acceptable range while white, yellow, and red colors represent decreasing plant performance, respectively. NRC inspectors review and verify the data submitted for each performance indicator annually through the baseline inspection process. If questions arise about how to calculate a particular indicator or what the correct value should be, there is a formal feedback process in place to resolve the issue. When performance indicator thresholds are exceeded, NRC responds in a graded fashion by performing supplemental inspections that range in scope depending on the significance of the performance issue.

Under the ROP, NRC places each plant into a performance category on the agency's action matrix, which corresponds to increasing levels of oversight based on the number and risk significance of inspection findings and performance indicators. The action matrix is NRC's formal method of determining what additional oversight procedures—mostly supplemental

inspections—are required.[5] Greater-than-green inspection findings are included in the action matrix for a minimum of four quarters to allow sufficient time for additional findings to accumulate that may indicate more pervasive performance problems requiring additional NRC oversight. If a licensee fails to correct the performance problems within the initial four quarters, the finding may be held open and considered for additional oversight for more than the minimum four quarters.

At the end of each 6-month period, NRC issues an assessment letter to each plant licensee. This letter describes what level of oversight the plant will receive according to its placement in the action matrix performance categories, what actions NRC is expecting the plant licensee to take as a result of the performance issues identified, and any documented substantive cross-cutting issues. NRC also holds an annual public meeting at or near each plant site to review performance and address questions about the plant's performance from members of the public and other interested stakeholders. Most inspection reports, assessment letters and other materials related to NRC's oversight processes are made publicly available through a NRC website devoted to the ROP. The website also includes plant-specific quarterly summaries of green or greater inspection findings and all the performance indicators.

NRC Has Continually Identified Problems at Nuclear Power Plants but Few Have Been Considered Significant to Safe Operation of the Plants

The ROP has identified numerous performance deficiencies as inspection findings at nuclear power plants since it was first implemented, but most of these were considered to be of very low risk to safe plant operations. Similarly, there have been very few instances in which performance indicator data exceeded acceptable standards. As a result, few plants have been subjected to high levels of oversight.

Of more than 4,000 inspection findings identified between 2001 and 2005, 97 percent were green. While green findings are considered to be of "very low" safety significance, they represent a performance deficiency on the part of the plant licensee and thus are important to correct. Green findings consist of such things as finding that a worker failed to wear the proper radiation detector or finding that a licensee did not properly evaluate and approve the storage of flammable materials in the vicinity of safety-related

[5]NRC officials can also increase or decrease oversight in ways not in accordance with those specified by the action matrix by requesting a deviation. This provision is intended for rare instances when the oversight levels dictated by the action matrix are not appropriate to address a particular performance problem and a more tailored approach is required.

equipment. NRC does not follow-up on the corrective action taken for every green finding identified; rather, it relies on the licensee to address and track their resolution through the plant's corrective action program. NRC does, however, periodically follow-up on some of the actions taken by the licensee to address green findings through an inspection specifically designed to evaluate the effectiveness of the licensee's corrective action program. NRC officials stated that green findings provide useful information on plant performance and NRC inspectors use the findings to identify performance trends in certain areas and help inform their selection of areas to focus on during future inspections. In contrast to the many green findings, NRC has identified 12 findings of the highest risk significance (7 yellow and 5 red), accounting for less than 1 percent of the findings since 2001. For example, one plant was issued a red finding—the highest risk significance—after a steam generator tube failed, causing an increased risk in the release of radioactive material.

Similar to the inspection findings, most performance indicator reports have shown the indicators to be within the acceptable levels of performance. Only 156, or less than one percent of over 30,000 indicator reports from 2001 to 2005, exceeded the acceptable performance threshold. Four of the 15 performance indicators have always been reported to be within acceptable performance levels. In addition, 46 plants have never had a performance indicator fall outside of the acceptable level and only three plants reported having a yellow indicator for one performance measure; no red indicators have ever been reported.

On the basis of its inspection findings and performance indicators, NRC has subjected more than three quarters of the 103 operating plants to at least some level of increased oversight (beyond the baseline inspections) for varying amounts of time. Most of these plants received the lowest level of increased oversight, consisting of a supplemental inspection, to follow-up on the identification of one or two white inspection findings or performance indicators. Five plants have received the highest level of plant oversight for which NRC allows plants to continue operations, due to the identification of multiple white or yellow findings and/or the identification of a red finding.[6] One plant received this level of oversight because NRC determined that the licensee failed to address the common causes of two white findings and held them open for more than four

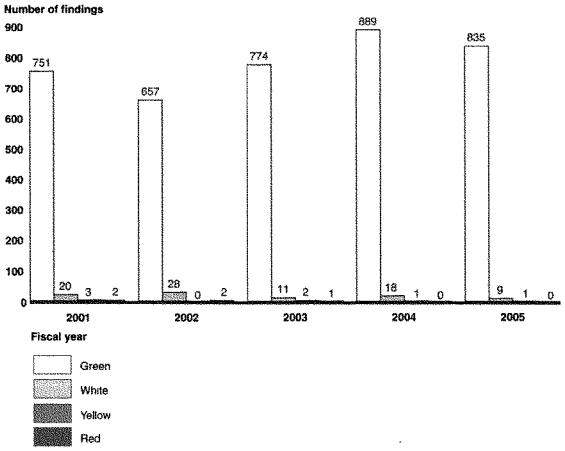
[6]NRC has one additional oversight category for plants with unacceptable performance. Plants placed into this category are not permitted to operate.

quarters. One of these findings involved the recurrent failure of a service water pump because the licensee failed to take adequate corrective action after the first failure.

NRC inspectors at the plants we reviewed indicated that, when plant performance declines, it is often the result of ineffective corrective action programs, problems related to human performance, or complacent management, which often results in deficiencies in one or more of the cross-cutting areas. In assessing the results of the ROP data, we found that all plants subjected to NRC's highest level of oversight also had a substantive cross-cutting issue open either prior to or during the time that it was subjected to increased oversight inspections.

Overall, NRC's oversight process shows mostly consistent results from 2001 to 2005. For example, the total number of green findings at all plants ranged from 657 to 889 per year and the total number of other findings ranged from 10 to 30 per year with no strong trend (see fig. 1).

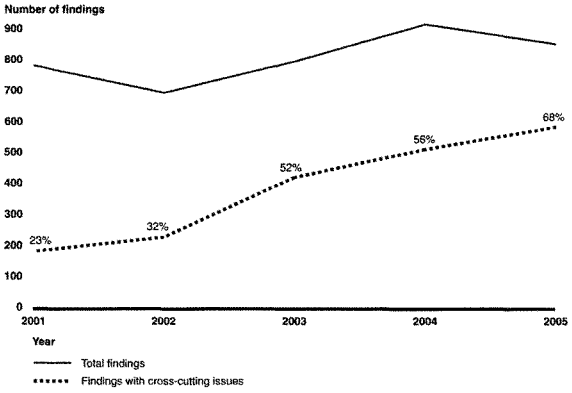
Figure 1: ROP Inspection Findings by Year



Source: GAO analysis of NRC data.

Only in the area of cross-cutting issues—or inspection findings for which one or more cross-cutting issues was associated—is an increasing trend evident (see fig. 2). According to NRC, the reason for this increase is due in part to the development of guidance on the identification and documentation of cross-cutting issues and its increased emphasis in more recent years.

Figure 2: Trend of ROP Findings with Cross-Cutting Issues



Source: GAO analysis of NRC data

According to NRC officials, the results of its oversight process at an industry or summary level serve as an indicator of industry performance, which to date indicates good safety performance. On an annual basis, NRC analyzes the overall results of its inspection and performance indicator programs and compares them with industry level performance metrics to ensure all metrics are consistent and takes action if adverse trends are identified. While NRC communicates the results of its oversight process on a plant-specific basis to plant managers, members of the public, and other government agencies through annual public meetings held at or near each site and an internet Web site, it does not publicly summarize the overall results of its oversight process, such as the total number and types of inspection findings and performance indicators falling outside of acceptable performance categories, on a regular basis.

NRC Continues to Make Improvements to its Reactor Oversight Process in Key Areas

NRC has taken a proactive approach to improving its reactor oversight process. It has several mechanisms in place to incorporate feedback from both external and internal stakeholders and is currently working on improvements in key areas of the process, including better focusing inspections on areas most important to safety, improving its timeliness in determining the risk significance of its inspection findings, and modifying the way that it measures some performance indicators. NRC is also working to address what we believe is a significant shortcoming in its oversight process by improving its ability to address plants' safety culture, allowing it to better identify and address early indications of deteriorating safety at plants before performance problems develop.

According to NRC officials, the ROP was implemented with the understanding that it would be an evolving process and improvements would be made as lessons-learned were identified. Each fall NRC solicits feedback from external stakeholders, including industry organizations, public interest groups, and state and local officials, through a survey published in the *Federal Register*. NRC also conducts an internal survey of its site, regional, and headquarters program and management staff every other year to obtain their opinions on the effectiveness of the ROP. Additionally, NRC has in place a formal feedback mechanism whereby NRC staff can submit recommendations for improving various oversight components and NRC staff meet with industry officials on a monthly basis—in addition to various meetings, workshops, and conferences—to discuss oversight implementation issues and concerns. NRC staff also incorporates direction provided by the NRC Commissioners and recommendations from independent evaluations such as from GAO and the NRC Inspector General. The results of these efforts are pulled together in the form of an annual self-assessment report, which outlines the overall results of its outreach and the changes it intends to make in the year ahead.

According to NRC officials, the changes made to the ROP since its implementation in 2000—including those made in response to the Davis-Besse incident—have generally been refinements to the existing process rather than significant changes to how it conducts its oversight. In the case of Davis-Besse, NRC formed a task force to review the agency's regulatory processes. The task force's report, issued in September 2002, contained more than 50 recommendations, many associated with the ROP. Among the more significant ROP-related recommendations were those to enhance the performance indicator that monitors unidentified leakage to be more accurate, develop specific guidance to inspect boric acid control programs and vessel head penetration nozzles, modify the inspection program to

provide for better follow-up of longstanding issues, and enhance the guidance for managing plants that are in an extended shutdown condition as a result of significant performance problems. NRC program officials told us that the task force's most significant recommendations were in areas outside of the ROP, such as improving the agency's operating experience program. According to NRC, it has implemented almost all of the task force's recommendations.

Other modifications that NRC has recently made or is in the process of making include the following:

- NRC recently revised seven of its baseline inspection procedures to better focus the level and scope of its inspection efforts on those areas most important to safety. These revisions resulted from a detailed analysis in 2005 of its more than 30 baseline inspection procedures. The effort involved analyzing the number of findings resulting from each of its inspection procedures and the time spent directly observing plant activities or reviewing licensee paperwork, among other things.

- NRC has efforts underway to improve what it refers to as its significance determination process (SDP). An audit by the NRC Inspector General, a review by a special task group formed by NRC, and feedback from other stakeholders have pointed to several significant weaknesses with the SDP. For example, internal and external stakeholders raised concerns about the amount of time, level of effort, and knowledge and resources required to determine the risk significance of some findings. Industry officials commented that because most inspection findings are green, one white finding at a plant can place it in the "bottom quartile" of plants from a performance perspective. Therefore, industry officials explained, licensees try to avoid this placement and will expend a great deal of effort and resources to provide additional data to NRC to ensure the risk level of a finding is appropriately characterized. This can add significant time to the process because different technical tools may be used that then must be incorporated with NRC's tools and processes. The delay in assigning a color to a finding while the new information is being considered could also affect a plant's placement on NRC's action matrix, essentially delaying the increased oversight called for if the finding is determined to be greater-than-green. NRC developed a SDP Improvement Plan in order to address these and other concerns and track its progress in implementing key changes. For example, NRC introduced a new process aimed at improving timeliness by engaging decision-makers earlier in the process to more quickly identify the scope of the evaluation, the resources needed, and the schedule to complete the evaluation.

- NRC is also taking actions to improve its performance indicators. These actions are partly to address concerns that the indicators have not contributed to the early identification of poorly performing plants to the degree originally envisioned as they are almost always within acceptable performance levels (green). There have been several cases where plants reported an acceptable performance indicator and performance problems were subsequently identified. For example, NRC inspectors at one plant noted that while performance indicator data related to its alert and notification system in place for emergency preparedness had always been reported green, the system had not always been verified to be functioning properly. On the other hand, industry officials believe that the high percentage of indicators that are green is indicative of plants' good performance. Several plant managers told us that they closely monitor and manage to the acceptable performance thresholds established for each indicator, and will often take action to address performance issues well before the indicator crosses the acceptable performance threshold. Because NRC inspectors verify indicator data once a year, a potential disagreement over the data might not surface for up to a year after it is reported, and it may take even longer to resolve the disagreement with the licensee. Similar to delays with the SDP, a delay in assigning a color while the disagreement is resolved could affect a plant's placement on NRC's action matrix, and delay the increased oversight called for if the indicator is determined to be greater-than-green. NRC plans to work with the industry to review selected indicator definitions to make interpretation more concise and reduce the number of discrepancies. To date, NRC has focused significant effort on developing a key indicator to address known problems with the performance indicators measuring the unavailability of safety systems. NRC is also in the process of changing the definition for several other indicators, in addition to considering the feasibility of new indicators.

I would now like to discuss what we believe is one of NRC's most important efforts to improve its oversight process by increasing its ability to identify and address deteriorating safety culture at plants. NRC and others have long recognized that safety culture and the attributes that make up safety culture, such as attention to detail, adherence to procedures, and effective corrective and preventative action, have a significant impact on a plant's performance. Despite this recognition and several external groups' recommendations to better incorporate safety culture aspects into its oversight process, it did not include specific measures to explicitly address plant safety culture when it developed the ROP in 2000. The 2002 Davis-Besse reactor vessel head incident highlighted that this was a significant weakness in the ROP. In investigating this event, we and others found that NRC did not have an

effective means to identify and address early indications of deteriorating safety at plants before performance problems develop.[7] Largely as a result of this event, in August 2004, the NRC Commission directed the NRC staff to enhance the ROP by more fully addressing safety culture.

In response to the Commission's directive, the NRC staff formed a safety culture working group in early 2005. The working group incorporated the input of its stakeholders through a series of public meetings held in late 2005 and early 2006. In February 2006, NRC issued its proposed approach to better incorporate safety culture into the ROP. NRC officials expect to fully implement all changes effective in July 2006.

NRC's proposed safety culture changes largely consist of two main approaches: first, clarifying the identification and treatment of cross-cutting issues in its inspection processes and second, developing a structured way for NRC to determine the need for a safety culture evaluation of plants. NRC has developed new definitions for each of its cross-cutting issues to more fully address safety culture aspects and additional guidance on their treatment once they are identified. For example, the problem identification and resolution cross-cutting area is now comprised of several components—corrective action program, self and independent assessments, and operating experience. NRC inspectors are to assess every inspection finding to determine if it is associated with one or more of the components that make up each of the cross-cutting areas. Inspectors then determine, on a semi-annual basis, if a substantive cross-cutting issue exists on the basis of the number and areas of cross-cutting components identified. If the same substantive cross-cutting issue is identified in three consecutive assessment periods, NRC may request that the licensee perform an assessment of its safety culture. The intent is to provide an opportunity to diagnose a potentially declining safety culture before significant safety performance problems occur.

Under its approach, NRC would expect the licensees of plants with more than one white color finding or one yellow finding to evaluate whether the performance issues were in any way caused by any safety culture components, and NRC might request the licensee to complete an independent assessment of its safety culture, if the licensee did not

[7]GAO, *Nuclear Regulation: NRC Needs to More Aggressively and Comprehensively Resolve Issues Related to the Davis-Besse Nuclear Power Plant's Shutdown*, GAO-04-415 (Washington, D.C.: May 17, 2004).

identify an important safety culture component. For plants where more significant or multiple findings have been identified, the NRC would not only independently evaluate the adequacy of the independent assessment of the licensee's safety culture, but it might also conduct its own independent assessment of the licensee's safety culture.

Some of NRC's proposed actions regarding safety culture have been controversial, and not all stakeholders completely agree with the agency's approach. For example, the nuclear power industry has expressed concern that the changes could introduce undue subjectivity to NRC's oversight, given the difficulty in measuring these often intangible and complex concepts. Several of the nuclear power plant managers at the sites we reviewed said that it is not always clear why a cross-cutting issue was associated with finding, or what it will take to clear themselves once they've been identified as having a substantive cross-cutting issue open. Some industry officials worry that this initiative will further increase the number of findings that have cross-cutting elements associated with them and if all of the findings have them they will lose their value. Industry officials also warn that if it is not implemented carefully, it could divert resources away from other important safety issues. Other external stakeholders, on the other hand, suggest that this effort is an important step in improving NRC's ability to identify performance issues at plants before they result in performance problems. Importantly, there will be additional tools in place for NRC to use when it identifies potential safety culture concerns. NRC officials view this effort as the beginning step in an incremental approach and acknowledge that continual monitoring, improvements, and oversight will be needed in order to better allow inspectors to detect deteriorating safety conditions at plants before events occur. NRC plans to evaluate stakeholder feedback and make changes based on lessons learned from its initial implementation of its changes as part of its annual self-assessment process for calendar year 2007.

GAO Contact and Staff Acknowledgments

For further information about this statement for the record, please contact me at (202) 512-3841 (or at wellsj@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Raymond H. Smith, Jr. (Assistant Director), Alyssa M. Hundrup, Alison O'Neill, and Dave Stikkers made key contributions to this statement.

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TESTIMONY FOR THE RECORD

SUBMITTED BY THE
NUCLEAR ENERGY INSTITUTE

TO THE
CLEAN AIR, CLIMATE CHANGE AND NUCLEAR SAFETY SUBCOMMITTEE
ENVIRONMENT AND PUBLIC WORKS COMMITTEE
UNITED STATES SENATE

JUNE 22, 2006

On behalf of the nuclear energy industry, the Nuclear Energy Institute (NEI) appreciates the opportunity to provide this testimony for the record on the role of nuclear energy in U.S. energy policy, on the value of our 103 operating nuclear power plants and on the strategic importance of building new nuclear power plants in the years ahead.

NEI is responsible for developing policy for the U.S. nuclear energy industry. Our organization's 270 member companies represent a broad spectrum of interests, including every U.S. energy company that operates a nuclear power plant. NEI's membership also includes nuclear fuel-cycle companies, suppliers, engineering and consulting firms, national research laboratories, manufacturers of radiopharmaceuticals, universities, labor unions and law firms.

America's nuclear power plants are the most efficient and reliable in the world. Nuclear energy is the largest source of carbon-free electricity in the United States and our nation's second-largest source of electricity after coal. Nuclear power plants in 31 states provide electricity for one of every five U.S. homes and businesses. More than eight out of 10 Americans believe nuclear energy should play an important role in the country's energy future.[1]

Given these facts and the strategic importance of nuclear energy to our nation's energy security, economic growth and environmental protection, NEI encourages Congress to maintain policies that ensure the continued viability of nuclear power and to provide the impetus required to expand carbon-free nuclear energy as a vital part of our nation's diverse energy mix.

NEI's testimony for the record will address two major areas:

- The nuclear energy industry in the United States and globally is on the verge of major expansion. As a result, the Nuclear Regulatory Commission needs to quickly adapt from an agency almost solely concerned with existing reactors to one that will effectively and efficiently regulate the design and construction of new nuclear plants. The agency faces a number of challenges that it must address to ensure a workable, efficient process for licensing new nuclear plants.

[1] Bisconti Research Inc./NOP World, May 2005, survey of 1,000 U.S. adults.

- The strategic value of America's nuclear power plants as a source of safe, reliable, clean electricity at stable prices, coupled with the industry's sustained high levels of nuclear plant performance, means that nearly all of our current reactors will renew their licenses. Many also will apply to increase power generating capacity. Although the NRC has made real progress in addressing licensing matters, given the need for new-plant licensing and for effective regulation of existing plants, the agency must do a better job of providing a regulatory environment that is effective, efficient, fair and transparent.

THE STRATEGIC VALUE OF NUCLEAR ENERGY

The United States has 103 nuclear reactors operating in 31 states, including eight states that produce more than one-third of their electricity from nuclear power plants. Nuclear power represented 20 percent of U.S. electricity supply 10 years ago, and it represents 20 percent of our electricity supply today, despite the fact that we have six fewer reactors than a decade ago and total U.S. electricity supply has increased by 25 percent in that period.

Nuclear power has maintained its market share because of dramatic improvements in plant reliability, safety, productivity and management. Today's reactors routinely operate at a 90 percent capacity factor. Improved productivity at U.S. nuclear plants has satisfied 20 percent of the growth in electricity demand over the past decade.

Increased output from U.S. nuclear plants in the past 10 years—from 640 billion kilowatt-hours in 1994 to 789 billion kilowatt-hours in 2004—is approximately equivalent to bringing 18 new 1,000-megawatt power plants into service.

Nuclear energy provides several important national benefits.

First, nuclear power plants contribute to the fuel and technology diversity that is the core strength of the U.S. electric supply system. This diversity is at risk because today's business environment and electricity-sector market conditions make investments in large, capital-intensive technologies difficult, particularly advanced nuclear power plants and advanced coal-fired power plants best suited to supply baseload electricity.

Coal and nuclear energy represent 70 percent of our electricity supply. However, since 1992, the electric industry has built more than 275,000 megawatts of natural gas-fired power plants, and added only 14,000 megawatts of new nuclear and coal-fired capacity. All of those baseload power projects started construction in the 1980s.

The United States is now suffering the consequences of relying too heavily upon one fuel for electricity production, natural gas. Although electricity prices on the whole have increased far less than the prices of other consumer goods during the past two decades, high natural gas prices have caused dramatic electricity price increases in many regions during the past year. Natural gas also is a critical feedstock for other industries, such as chemical plants. The chemical industry has lost $50 billion in business to overseas operations since 2000, closed 100 chemical plants and laid off more than 100,000 workers. Natural gas has many desirable characteristics

and should be part of our fuel mix, but over-reliance on natural gas or any one fuel source leaves consumers vulnerable to price spikes and supply disruptions in many sectors of the economy.

Second, nuclear power plants provide price stability that is not available from electric generating plants fueled with natural gas. The intense volatility in natural gas prices over the last several years is likely to continue, largely because of unsustainable demand for natural gas from the electric sector. Such price volatility also subjects the U.S. economy to potential damage. The operating costs of nuclear power plants are stable and can dampen volatility of consumer costs in the electricity market. The supply and demand characteristics of natural gas have driven hundreds of thousands of jobs offshore in those industries that relied on natural gas as a feedstock and for heat and power.

Third, nuclear power plants are a key part of our diversified electricity supply and play a strategic role in meeting U.S. clean-air goals and the nation's goal of reducing greenhouse gas emissions. Nuclear power plants produce electricity that otherwise would be supplied by gas- or coal-fired generating capacity. They therefore prevent the emissions that fossil-fuel fired plants otherwise would produce.

U.S. nuclear power plants are essential in meeting clean-air regulations. In 2005, they prevented the emission of about 3.3 million tons of sulfur dioxide (SO_2) and about 1.1 million tons of nitrogen oxide (NO_X). To put these numbers in perspective, requirements imposed by the 1990 Clean Air Act amendments reduced SO_2 emissions from the electric power sector between 1990 and 2001 by about 5 million tons per year, and NO_X emissions by about 2 million tons per year.[2] Thus, in a single year, nuclear power plants avoid emissions nearly equivalent to those produced over an 11-year period by other sources.

The NO_X emissions prevented by U.S. nuclear plants are equivalent to eliminating NO_X emissions from six out of 10 passenger cars in the United States. The carbon emissions prevented by nuclear power plants are equivalent to eliminating the carbon emissions from nine out of 10 passenger cars in the United States. Without nuclear energy, greenhouse gas emissions from the electric power sector would be approximately 30 percent higher. This is significant, since the electricity sector is responsible for approximately one-third of U.S. greenhouse gas emissions.

Finally, nuclear energy is a secure source of energy, and the United States is not alone in recognizing nuclear energy's importance to energy security and, therefore, national security. The decision to use nuclear power as a major energy source in countries such as France and Japan was based on energy security. The governments of all three countries recognized in the 1970s that nuclear energy protects their energy supplies from disruptions caused by political instability and protects consumers from price fluctuations caused by market volatility. France depends on 59 reactors to meet more than three-quarters of its electricity demand, while one-quarter of Japan's comes from its 55 reactors.

Despite strong international commitment to nuclear power, evidenced by the 27 nuclear reactors under construction today around the world, the U.S. nuclear energy sector remains by far the

[2] "EPA Acid Rain Program: 2001 Progress Report," U.S. Environmental Protection Agency, November 2002.

world's largest in terms of electricity production—larger than the nuclear sectors of France and Japan combined.

Public support for nuclear energy in the United States has grown steadily as a result of excellent plant safety and performance, as well as growing awareness of nuclear energy's benefits. A March 2006 survey revealed that 86 percent of the general public agrees that nuclear energy will play an important role in meeting our nation's electricity needs in the years ahead. In addition, 73 percent found it acceptable to add a new reactor at the nearest existing nuclear plant site. Overall, 68 percent of Americans surveyed support nuclear energy, while 29 percent oppose it.[3]

In summary, nuclear energy represents a unique value proposition. Nuclear power plants provide a tremendous supply of baseload electricity—cleanly, reliably and safely. They provide low-cost electricity for consumers and businesses today, and serve as a hedge against price and supply volatility. Nuclear plants have valuable environmental attributes, and they help preserve our nation's energy security. In addition, the American public supports the expansion of nuclear energy. These factors demonstrate why nuclear energy has strategic importance in U.S. energy policy.

THE NUCLEAR ENERGY INDUSTRY IS ON THE VERGE OF A MAJOR EXPANSION

Independent analyses by the University of Chicago and the Massachusetts Institute of Technology in 2003 and 2004, respectively, found that the first few new nuclear power plants would face unique economic and financing hurdles. The Energy Policy Act of 2005 (EPAct) addressed these hurdles with limited investment incentives for the construction of a limited number of new nuclear plants in the United States. A production tax credit, similar to the long-standing credit for wind and solar generation, and a loan guarantee program, available to all low- or zero-emission generation, were designed to improve the economics of and to facilitate financing for the first few new nuclear power plants. The legislation also provided standby support, a form of insurance, to help protect private companies against delays caused by licensing or litigation due to factors beyond their control.

The EPAct incentives are having their intended impact. A year ago, two consortia were developing applications for the licenses necessary to build and operate new nuclear power plants. Now, nine companies or groups of companies are developing applications for combined construction and operating licenses for as many as 20 new nuclear reactors. We expect those applications to be filed with the NRC between 2007 and 2008. A chart displaying the status of new nuclear plant development in the United States is attached to this testimony as Exhibit A. Companies plan to locate most of these new reactors at existing nuclear power plant sites to take advantage of existing infrastructure such as cooling water capacity and transmission lines.

A decision to pursue an NRC combined construction and operating license represents a significant investment of resources and is a major step toward the construction of a nuclear power plant. Obtaining NRC approval of such an application is a three- to four-year process and is estimated to cost from $50 million to $90 million, depending upon whether the application is based on a certified reactor design. NEI estimates that the industry is investing more than $1.5

[3] Bisconti Research Inc./NOP World, March 2006, survey of 1,000 U.S. adults.

billion to develop license applications, complete design and engineering work, and order long-lead equipment such as reactor vessels. This is convincing evidence that the construction of new nuclear plants in the United States has moved from a possibility to reality.

Increasing investment by the public and private sectors in exploring the construction of new nuclear plants has generated interested on Wall Street. Fitch Ratings is one of the Wall Street firms bullish on the prospect of new nuclear plants in the near term:

> It is no longer a matter of debate whether there will be new nuclear plants in the industry's future. Now, the discussion has shifted to predictions of how many, where and when. ... New nuclear plants and baseload power plants using new coal technologies are least likely to appear in the populous and energy-hungry Northeast or in California, regions that already have significantly higher energy prices than the Southeast and Midwest. For political or geological reasons, these regions are likely to rely either on gas-fired power facilities or costly investments for other resources, such as wind or solar. These differences will tend to favor lower energy prices in the Southeast and Midwest to the disadvantage of the Northeast and California.[4]

Expansion of the nuclear energy industry has enormous positive implications for the U.S. economy and for American workers. In addition to other benefits provided by nuclear energy, building new nuclear plants will create thousands of jobs for highly skilled workers who design and build the plants, manufacture the equipment and fuel, and operate the plants when built. New nuclear plant construction also will help restore U.S. technological leadership in this high-tech field.

Leadership by the United States will be strategically and economically important as other nations consider nuclear power to meet their energy needs and announce even more ambitious plans. France has constructed dozens of nuclear plants, based on U.S. light-water reactor designs, in the past two decades. China and India have announced major expansion plans for their nuclear generation. NEI now estimates that more than 120 reactors could be constructed worldwide in the next 15 years, including up to 20 in the United States.

Contrary to widespread belief, new nuclear power plants are not expected to face significant opposition by those espousing a NIMBY, or "not in my backyard," perspective. While public support for nuclear energy has reached record levels, that support is even stronger in the communities surrounding existing nuclear power plants. Eighty-three percent of residents near U.S. nuclear plants support the use of nuclear energy and more than two-thirds would find it acceptable to build a new reactor at the nuclear power plant closest to where they live.[5]

Last fall, the NuStart Energy consortium was in the process of selecting two potential sites for new nuclear plants. During the selection process, state, county and local officials from New York, Louisiana, South Carolina, Alabama, Maryland and Mississippi competed vigorously for

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[4] "Wholesale Power Market Update," Fitch Ratings Ltd., March 13, 2006.

[5] Bisconti Research Inc., August 2005, national survey of 1,050 residents who live within 10 miles of a nuclear power plant. Margin of error is +/- 3 percentage points.

construction of nuclear power plants in their area. This experience turns the NIMBY syndrome on its head.

LICENSING AND BUILDING NEW NUCLEAR PLANTS CREATES SIGNIFICANT MANAGEMENT HURDLES FOR THE NRC

Expansion of the commercial nuclear industry will be a critical test of NRC management skills as it attempts to conduct efficient, timely rulemakings and licensing proceedings. No company has ordered a new nuclear plant in the United States for over two decades, and the last time a new nuclear plant began generating electricity was in 1996 at Tennessee Valley Authority's Watts Bar plant. The infrastructure for licensing new nuclear plants at the NRC has been dormant.

The industry licensed the majority of today's nuclear power plants during the 1960s and 1970s. At that time, the industry was new and the regulatory process evolved along with it. Plant designs were not standardized, and the NRC issued construction permits based upon preliminary plant designs. Safety issues often were not fully resolved until the plant was complete and awaiting start-up. Delays at that point in the process were not only common, but expensive.

To address some of the flaws in the process, the NRC established a new licensing process, codified as 10 CFR Part 52. Congress affirmed and strengthened this new process as part of the Energy Policy Act of 1992. This new licensing approach for new nuclear plants moves the major licensing and safety approvals to the front of the process: (1) approval of standard reactor designs, (2) approval of early site permits for prospective plant locations, and (3) approval of a single license for the construction and operation of a new nuclear plant. To ensure the plant is built according to the approved design, the NRC developed a package of inspections, tests, analyses and acceptance criteria it will use to confirm safety and engineering specifications.

The NRC licensing process incorporates input from the public and other stakeholders, before plant construction, at a time when such input can influence plant design and licensing issues. This process should help avoid the costly delays common to the old way of licensing a nuclear plant. The old licensing process was a two-step process that did not require the completion of the design and engineering before the issuance of a construction permit. As a result, lengthy and costly hearings often took place after the plant was built and before it was allowed to operate.

The design certification process allows plant designers to secure advance NRC approval of standard plant designs that companies will use for the next generation of nuclear plants. A company could order a plant using an approved design, license it for a particular site and build it. Following an exhaustive NRC safety review, the agency formalizes each standardized design with a rulemaking. NRC approval for design certification takes three to five years.

To date, the NRC has certified four advanced plant designs—the Westinghouse AP600 and AP1000, General Electric ABWR, and Combustion Engineering (CE) System 80+. CE is now owned by Westinghouse. One additional design has been submitted and is under review—GE's ESBWR. Another design, AREVA's EPR, is in the pre-certification review stage.

The early site permit (ESP) process enables companies to obtain approval from the NRC for a nuclear plant site before deciding to build the plant. This process resolves any site suitability issues before funds are committed to construction. An early site permit application comprises three parts—an environmental report, a site-safety analysis and emergency planning information—that the NRC then reviews and, if appropriate, approves.

The industry is validating this new licensing process. In 2003, Dominion, Exelon and Entergy, assisted by the Department of Energy in a cost-shared program, initiated projects to obtain NRC approval for early site permits. The NRC expects to issue the permits in 2007. The permits would allow the companies to "bank" those sites for up to 20 years for possible future use, when business circumstances indicate the need and benefit of building a new nuclear power plant. However, problems have emerged concerning the finality of environmental reviews, and the industry now has serious concerns over the ESP process.

The body of regulations governing licensing, Part 52, also allows the NRC to issue a combined construction and operating license (COL). A COL application may reference a certified design, an early site permit or both. A typical COL application is a significant decision toward ordering a new nuclear plant. The application requires that companies develop detailed and extensive documentation for review by the NRC. Although no company has submitted a COL application to the NRC, the industry expects to file 10 applications within the next 30 months.

The first major decision a company must make in the sequential steps toward building a new plant is to prepare a COL application. Preparation of the initial COL application takes more than 18 months. NRC review and approval for the first COL application using a new design is scheduled to take 36 to 42 months. Around two years before a company expects approval of a COL, the company will start long-lead procurement of major components, such as reactor vessels and steam generators. The final major decision is to determine when to proceed with actual construction. This is the time when financing, purchased power agreements for electricity generated by the plant, ownership and operational considerations must be in place and other associated issues resolved.

Based in part on international experience, the industry estimates that construction of the first new nuclear reactors will take 48 months from the pouring of concrete for safety-related structures to loading the reactor with fuel. This time frame is likely to decrease to perhaps 40 months as companies gain construction experience.

THE NRC HAS MADE SUBSTANTIAL PROGRESS BUT CAN AND MUST DO BETTER IN RESPONDING TO THE CHALLENGE OF LICENSING NEW PLANTS

As a result of this accelerated movement toward building new nuclear plants, the NRC faces major challenges in creating a regulatory process that will address effective, efficient and timely handling of the design certifications, ESPs, COLs and generic licensing work expected in the next few years. The nuclear energy industry is committed to working with the NRC in meeting these challenges. The industry recognizes the sound advice of NRC Chairman Nils Diaz that the agency's ability to review applications efficiently depends upon the quality of the information in the application. The industry also fully supports the NRC's design-centered approach to

reviewing the COL applications and expects that this approach will provide significant efficiencies once the agency has completed the first few reviews of each design. In fact, the industry expects this approach will decrease the review schedule from the 42 months mentioned above to less than 24 months.

The industry remains concerned, however, that the NRC still faces significant challenges. Chief among these challenges is the need for the agency to finalize its revisions to the Part 52 licensing regulation. The NRC initiated this process in 1998, nearly eight years ago, yet the agency still has not finished. Earlier this year, the NRC once again decided to revise Part 52 with a goal of approving the revision in January 2007. NEI strongly urges the NRC to complete the Part 52 rulemaking before January 2007, since the industry has begun preparing standardized COL applications and needs final guidance.

In addition, the NRC is conducting rulemakings on security and "fitness-for-duty" matters that have provisions applicable to the licensing of new plants. Timely completion of these rulemakings, including careful consideration of input from the industry and other stakeholders, will be essential. The industry urges the NRC to complete these rulemakings before June 2007 and enhance stakeholder participation by conducting public meetings as part of the process.

In addition, the NRC plans to issue a COL application regulatory guideline by the end of 2006 for companies to use as they prepare COL applications. The industry and other stakeholders have worked with the NRC for several years to help develop guidance for COL applicants. Guidance for NRC reviewers also is being updated in a separate document—the NRC Standard Review Plan. Thus, two separate documents have the same objective: providing guidance on the scope and content of an application. The need for rigid consistency between these two documents will be a major challenge for industry and NRC resources over the next eight months. To address this, the industry recommends that the NRC combine the two documents and issue the updated product as soon as possible.

The industry is increasingly concerned that regulatory guidance may not be available from the NRC in a practical form in sufficient time for applicants to complete, without delay, drafting and finalizing the extensive applications already being prepared. This issue, when coupled with the length of a license review, introduces a level of uncertainty in the business-case assessments for deployment of new nuclear plants, even for an application that references an approved site and an approved reactor design.

Based on the current estimates for at least the first few applications, it could take 10 years or more to bring a new nuclear plant on line from the time a decision is made to proceed with a COL application. This schedule must be improved so that it is equivalent to schedules being achieved in other countries—seven years or less. A critical factor that will help achieve this goal is ensuring finality in the regulatory decision-making process. Once the NRC issues a design certification, ESP or COL, its regulatory decisions should be final unless substantive information is provided that requires additional review.

Extended delays in the NRC's review of a license application can impact a company's decision to finance construction; thus, such delays can have a major impact upon our nation's electricity supply.

The Environment and Public Works Committee has a critical role to play in ensuring the NRC manages the new licensing processes in a disciplined and efficient manner. The overall objective for this industry initiative is to ensure new nuclear plants can be operational by 2014-2015. This timetable is necessary to meet growing electricity demand, and it will require an aggressive industry and NRC effort to complete design, engineering and licensing work before companies can place orders and invest in construction.

Additional resources alone will not allow the NRC to fulfill this mission. The NRC must incorporate comprehensive, transparent planning and management practices that will provide the agency a framework for the upcoming expansion with meaningful input by Congress, the industry and other stakeholders.

INDUSTRY INITIATIVES TO INCREASE NUCLEAR ENERGY PRODUCTION

Nuclear power plants are such valuable electric generating assets that industry expects virtually all companies to pursue the option of extending their existing plant operating license. The NRC has approved 20-year extensions of operating licenses for 42 reactors and is reviewing nine additional applications for renewal. It expects to receive 27 more applications by 2012. These 78 reactors represent three-quarters of the operating reactors in the United States.

To maintain safety and reliability, and to prepare plants for an additional 20 years of operation, the industry is investing in large capital improvement projects, including the installation of new steam generators, new reactor vessel heads and other modifications to increase plant reliability, safety and generating capacity. These capital improvement projects position the plants for many years of operation and demonstrate the industry's commitment to making the capital investments necessary to maintain safety and reliability.

The industry steadily continues to increase generating capacity—either through power uprates or, in one case, refurbishing a shuttered nuclear plant. An uprate allows the plant to produce more electricity than its original rated capacity. Uprates can increase a plant's capacity by up to 20 percent, depending on plant design and how much capital a company is prepared to invest.

Over the past several years, the NRC has authorized power uprates representing approximately 2,000 megawatts (MW) of additional generating capacity. For instance, Entergy's Vermont Yankee plant received approval for a 20 percent increase and recently brought that additional capacity online. Progress Energy's Brunswick plant also completed a 20 percent capacity increase last year. Over the next five years, the NRC anticipates that companies will apply for approximately 30 more power uprates, which could add another 2,000 MW of new capacity.

In addition, the Tennessee Valley Authority is refurbishing a reactor at its Browns Ferry site in northern Alabama. This is a complex project—fully as challenging as building a new nuclear plant—and it remains on schedule and is expected to begin producing electricity in mid-2007.

The industry believes that the NRC is handling applications for license renewal and for power uprates in an effective and timely manner. The industry compliments this committee for recognizing the importance of this issue several years ago and for working with the NRC to provide resources and guidance to effectively address license renewals.

THE NRC REACTOR OVERSIGHT PROCESS HAS PROVEN SUCCESSFUL

Congressional oversight performs an important role in maintaining and encouraging the certainty and stability of the NRC's regulatory process and in providing transparency on the safety of the plants to all stakeholders. Such regulatory certainty and regulator credibility are essential for today's nuclear power facilities and are equally critical in licensing new nuclear power facilities. Several years ago, this committee encouraged the NRC to move toward a new reactor oversight process for the nation's nuclear plants, a process based on quantitative performance indicators and safety significance. Today's reactor oversight process is primarily designed to focus industry and NRC resources on equipment, components and operational issues that have the greatest importance to, and impact on, safety.

The NRC has six years of experience with this revised reactor oversight process. The new approach is successful in improving the transparency, objectivity and efficiency of regulatory oversight. It is a clear improvement over the agency's previous approach to evaluating nuclear plant safety.

The reactor oversight process combines the results of performance indicators in 18 key areas and findings from about 2,500 hours of NRC inspections per reactor to determine the appropriate allocation of inspection resources across all operating plants. The most recent results, after fourth quarter 2005, are as follows:

- 85 reactors had all green (best level) performance indicators and inspection findings and will receive the baseline level of NRC inspection (approximately 2,500 hours per year)
- 11 reactors had a single white (second-best level) performance indicator or inspection finding and will receive supplemental inspection beyond the baseline effort
- 7 reactors had more than one single white indicator or finding in a performance area or had white indicators or findings in different performance areas and will receive more in-depth inspection.

The industry views this trend as a substantial success and a strong example of the success of a safety-focused, performance-based regulatory approach.

Although the industry believes that nuclear plant safety and performance demonstrates the success of the reactor oversight process, it is concerned that subjectivity is creeping back into the process. In the first three years of the oversight process, the NRC identified an average of 60 cross-cutting issues per year throughout the industry. By 2005, however, that number had increased to more than 600 cross-cutting issues, a tenfold increase, even as industry performance

remained at high levels. Cross-cutting issues are those findings by resident inspectors at plants that may impact important operational factors, such as human performance, problem identification and resolution, and safety-conscious work environment.

This precipitous, largely unexamined, growth in the number of identified cross-cutting issues raises concerns on the objectivity and, ultimately, the effectiveness, of the NRC's initiative on safety culture assessment.

Another example of increasing subjectivity in the NRC's performance is the dramatic increase of "negative observations" by resident inspectors over the past few years. A negative observation is simply a written finding that does not have enough significance to merit official action. Plant operators are nonetheless compelled to respond, even though such observations have little, if any, safety significance.

These examples identify areas that the NRC should review to ensure the effectiveness of the oversight process. Because neither the body of NRC regulations nor its inspection process incorporates safety-focused approaches, they tend to identify findings that are potentially appropriate from a regulatory perspective but are not necessarily significant from a safety perspective. Three cornerstones of the regulatory oversight process—emergency preparedness, security and radiation safety—are not safety-focused. The oversight process as it relates to these cornerstones should be reviewed to ensure it is not misleading the public or misallocating NRC and industry resources.

The industry believes that the NRC, the industry and other stakeholders would benefit if the intent of the reactor oversight process were codified through an NRC Policy Statement, drafted by the commissioners who provided the policy guidance that established the process. This will be particularly important as changes occur within the NRC commission and staff over the next several years.

THE NEED FOR SAFETY-FOCUSED, PERFORMANCE-BASED REGULATION AND A STABLE REGULATORY ENVIRONMENT

The industry strongly supports the NRC's acceptance of the concept of safety-focused regulations. Implementing such concepts in its new reactor oversight process and for inspections demonstrates the value of safety-focused regulatory concepts.

During the past two years, NRC Chairman Diaz has articulated a sound approach to the future regulatory structure of our industry. He said, "21st century nuclear regulation needs to be anchored in realistic conservatism or conservative realism if we are to avoid the twin pitfalls of underregulation and overregulation." Such an approach would recognize conservative defense-in-depth regulation informed by science, engineering and nearly 10,000 reactor years of experience worldwide. But achieving a fair, predictable regulatory environment requires the same predictability and realism in plant security and emergency preparedness.

The NRC is moving to incorporate safety-focused insights into federal regulation, but in developing two recent proposed rules, the agency at least initially has fallen short of this goal.

The industry strongly supports the adoption of safety-focused regulation but is increasingly concerned that the NRC is reverting to a pattern of focusing on matters with very low safety significance, a situation that spurred the development of the two regulations. As a result, the implementation of new safety-focused regulation would yield few benefits if the NRC does not focus on safety-significant matters in practice.

In addition, the industry is increasingly concerned over the slow place of progress by the NRC toward placing a greater safety focus on other regulations. This initiative began nearly seven years ago, yet the NRC has addressed only two regulations. The industry urges the committee to restore a sense of urgency to this initiative.

Last year, the industry recommended that the NRC develop an integrated rulemaking plan to transform the existing deterministic regulations into a more effective, safety-focused regime. NEI continues to see a real need for such a plan that the agency can share with the committee, the industry and other stakeholders.

Finally, the NRC increasingly has used generic communications, such as generic letters, regulatory issue summaries and security advisories, to establish new requirements on licensees without the normal rulemaking process as established by the Administrative Procedures Act. The NRC's inspector general recently reached a similar conclusion (OIG-05-A-19). This has been a particular problem in security regulations, where the NRC has repeatedly changed and increased requirements. But, it also is occurring outside of security issues.

It is essential that the NRC adhere to its formal regulatory process to ensure the effectiveness of the regulatory regime and to provide certainty for the operations of existing nuclear plants and for companies to make decisions about building new plants. As the NRC loses institutional knowledge and experience through retirements and trains hundreds of new employees, adherence to formal regulatory processes will provide the foundation upon which it can maintain its effectiveness and credibility with all stakeholders.

CONGRESS SHOULD REVIEW NRC BUDGET AND STAFFING LEVELS

The NRC's budget continues to increase significantly. Its fiscal 2007 budget request of $777 million is the highest ever for this agency—a nearly 60 percent increase from a $488 million budget just six years ago. The number of full-time-equivalent (FTE) positions at the NRC has increased by more than 18 percent, from 2,785 to 3,309 during the same period. In addition, the NRC recently requested that Congress provide an additional $40 million to support new-plant licensing activities and to begin hiring some 350 to 400 employees over the next two to three years.

Just last year, the NRC's budget request was $702 million. If Congress provides the additional $40 million as requested, the NRC's budget will have increased by over 15 percent in a little over a year. This is attributable in part to an additional $21 million added to the NRC's budget last year to pay for site-specific risk assessments and an additional $20 million to prepare for potential COL applications.

As licensees are required to pay 90 percent of the NRC's budget—after the deduction of Nuclear Waste Fund and security expenses—these budget increases lead to significant increases in NRC user fees to the industry. The NRC only recently announced its licensing, inspection and annual fees for 2006. Under that guideline, the fee for each power reactor will be $3.7 million, a 16-percent increase over the 2005 annual fee. If the NRC is provided the increases requested, the industry expects fees for fiscal 2007 to increase by more than 10 percent next year as well.

The nuclear energy industry recognizes that budget and staffing increases will be required to address new-plant activity. It also recognizes impending work-force issues; we support efforts to ensure the NRC is provided adequate resources to do its job. But the rapid expansion of the NRC's budget, well above inflationary increases, imposes management challenges on the commission and economic pressure on the industry.

This committee should carefully monitor the ability of the NRC to hire qualified staff, as well as its ability to train and educate new employees for the tasks ahead.

The industry believes that the NRC must continue to be an effective and efficient regulator. The NRC should not address its managerial challenges simply by spending more money. It should look for ways to reallocate or consolidate its resources and should review its organizational structure to determine if changes are needed to respond to the continued consolidation in the nuclear industry. And, as it implements new and more efficient methods of regulation, such as the ROP, it should examine whether staffing and funding efficiencies can be achieved as well.

The NRC's budget must be more transparent and needs to provide more accessible and understandable data. Without greater transparency and additional data, it is difficult for Congress and stakeholders to analyze how the agency is utilizing its resources. For example, the industry is concerned that the NRC has not provided sufficient transparency and detail to justify its recent budget increases. When asked to explain the over $70 million increase over last year's budget, the NRC responded with details from the 2006 budget that did not include those funds.

We urge this committee to require that the NRC provide sufficient detail, similar to the detail provided to justify the fee recovery rule each year, for such budget requests. Doing so will help initiate effective and efficient planning at the NRC and will enable the industry to provide effective comments on the planned increases.

We are encouraged by the NRC chairman's insistence that the agency adopt "total quality management" or a similar approach. We agree and once again urge that the committee review the NRC's structure and management. The industry believes that the NRC would benefit from an independent management assessment of the agency's needs and plans to meet its organizational and work-force challenges.

CONCLUSION

The nuclear energy industry in the United States is preparing for rapid expansion—an expansion that will be an enormous boost to our nation's efforts to ensure an adequate supply of baseload electricity to power our economy and achieve energy security. It will be difficult, if not

impossible, for our nation to address its growing need for electricity and to achieve our clean air goals without a significant increase in nuclear power's total generating capacity.

Because Congress has tasked the NRC with issuing licenses for new reactor designs and for building new nuclear power plants, the agency is at the forefront of this expansion. The NRC has responded appropriately with requests for more funds to support a large increase in staff to handle this increased activity. Although the agency has made progress, the NRC can and must address the challenges of increased licensing activities in a more timely and efficient manner.

As the NRC adjusts to the regulatory demands of new plants, it cannot and should not overlook the regulation of the existing fleet of nuclear power plants. The new reactor oversight process is a significant improvement over the NRC's previous regulatory process. However, it is critical that the commission and NRC management ensure that the process stays safety-focused and responsive to stakeholder input. The NRC's effort to formalize safety-focused regulations needs more attention and more discipline to ensure that it successfully completes and implements current rulemakings.

To address these issues, NEI recommends that Congress:

- Provide the NRC with adequate funding, but insist that the NRC seek management assistance, such as an independent review, that can provide the agency with advice on setting and meeting deadlines. This advice would prove beneficial for reviewing new-plant applications; it also would assist in any necessary revision of the reactor oversight process.

- Ensure the NRC utilizes its formal regulatory processes and does not rely upon informal, undisciplined or nontransparent processes for imposing requirements on existing or new plants.

- Require the NRC to provide the public with the necessary budgetary details to justify increases, particularly those requested outside the normal agency budget submittal and review process. Providing such details only after their approval does not allow for stakeholder input into the process.

- Continue its strong and active oversight of the NRC by conducting additional hearings and by requiring the NRC to continue to report to Congress at least quarterly. These reports should include information on schedules for addressing the challenges identified in this testimony and elsewhere, together with details on the agency's progress in meeting those challenges.

U.S. New Nuclear Plant Status

Company	Site(s)	Early Site Permit (ESP)	Design, # of Units*	Construction / Operating License (COL)
Dominion	North Anna	Under review, approval expected 2006	ESBWR (1)	Application in 2007
TVA (NuStart	Bellefonte	-	AP1000 (2)	Application in 2007
Entergy (NuStart)	Grand Gulf	Under review, approval expected 2007	ESBWR (1)	Application in 2007 / 2008
Entergy	River Bend	-	ESBWR (1)	Application in 2008
Southern Company	Vogtle	Under development, to be submitted 2006	AP1000 (2)	Application in 2008
Progress Energy	Florida (TBD), Harris	-	AP1000 (4)	Two applications in 2007 / 2008
SCE & G and Santee Cooper	Summer	-	AP1000 (2)	Application in 2007
Duke and Southern Company	Cherokee County, South Carolina	-	AP1000 (2)	Application in 2007
Exelon	Clinton	Under review, approval expected 2007	Not yet determined	Not yet determined
UniStar	Calvert Cliffs or Nine Mile Point	Will go to COL but submit siting information early	EPR (1 - 4)	Application in 2008 (EPR design certification conducted in parallel)
Florida Power & Light	Not yet determined	-	Not yet determined	Application in 2009
Duke	Davie County, North Carolina	Under consideration	-	-
Duke	Oconee County, South Carolina	Under consideration	-	-

Source: NEI
*Reactor vendors/design: AREVA–EPR; General Electric–ESBWR; Westinghouse–AP1000
Updated: 6/06

FACT SHEET

Licensing New Nuclear Power Plants

June 2006

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Key Facts

■ The vast majority of today's 103 U.S. nuclear power plants were licensed during the 1960s and 1970s. Commercial nuclear energy was new, and the regulatory process evolved along with the new industry. Plants were issued a construction permit based on a preliminary design. A major flaw in the licensing and construction process was that safety issues were not fully resolved until the plant was essentially complete.

■ To address flaws in the process, the U.S. Nuclear Regulatory Commission in 1989 established a new licensing process: 10 CFR Part 52. Congress affirmed and strengthened the new licensing process as part of the 1992 Energy Policy Act.

■ The new approach for licensing nuclear power plants moves the licensing and safety issues to the front of three processes: approval of standard designs, early site permits, and combined construction permits and operating licenses. To ensure a company builds a new plant according to its license, the NRC introduced a process that determines which kinds of inspections, tests, analyses and acceptance criteria (ITAAC) it will use to ensure the plant is built according to the design approved in the licensing proceedings.

New Licensing Process

The new NRC licensing process has three parts: design certification, early site approval and combined license for construction and operation.

Design Certification

The design certification process allows for plant designers to secure advance NRC approval of standard plant designs. Later, these plant designs can be ordered, licensed for a particular site and built.

Following an exhaustive NRC safety review, agency approval of standard designs is formalized via a specific design certification rulemaking. This process allows the public to review and comment on the designs up front—before any construction begins. NRC design certification fully resolves safety issues associated with the design. The NRC approves the design for 15 years.

To date, the NRC has certified four advanced-plant designs, and two more are under certification review. The NRC expects to receive several more applications for design certification over the next few years.

Design standardization offers significant benefits. It means that reactors will be built in families of the same design, except for a limited number of site-specific differences. Standardization will reduce construction and operating costs, and lead to greater efficiencies and simplicity in nuclear plant operations, including safety, maintenance, training and spare parts procurement.

International experience demonstrates the benefits of standardization. The French nuclear program is based on standardized nuclear plant designs. Over nearly two decades, France built 34 standardized 900-megawatt reactors and 20 1,300-megawatt reactors, which now supply about 75 percent of the country's electricity.

Early Site Approval

The early site permit (ESP) process enables companies to obtain approval from the NRC for a nuclear power plant site before deciding to build a plant. The process resolves any site suitability issues before companies commit funds to a project. Companies can "bank" sites approved by the NRC for up to 20 years and build when the time is right. Having a pre-approved site can dramatically shorten the time to bring a new plant to market.

Licensing New Nuclear Power Plants

ESP applications consist of three components: a site safety analysis, an environmental report and emergency planning information. Federal, state and local government officials and the public have opportunities to participate in each of these at various stages during the NRC review process.

An ESP review process that encompasses a range of reactor designs enables companies to select the best design when they proceed with a decision to build. Through the use of the "plant parameters envelope" concept, the NRC can assess the suitability of a site based on a generalized plant description that takes into account the characteristics of several designs—for example, the height of the tallest building and the greatest cooling water requirement for any design under consideration. Using this approach, the NRC has the information it needs to assess site suitability, and companies can choose the best technology when they proceed with a new plant.

The Combined License

Part 52 provides for issuance of a combined construction permit and operating license, also known as a combined license (COL). A COL may reference a certified design, an ESP or both.

All issues resolved in connection with earlier proceedings associated with a standard design or site will be considered resolved for purposes of the COL proceeding. This makes the process more efficient by allowing the NRC review and a public hearing for a COL to focus on remaining issues related to plant ownership, design issues not resolved earlier, and organization and operational programs.

Granting a COL signifies resolution of all safety issues associated with the plant.

The one issue that cannot be addressed up front is whether the constructed plant conforms to the requirements of the license and is ready to operate. For this, Part 52 provides the ITAAC process, which specifies the inspections, tests, analyses and acceptance criteria that will be used to assess the completed plant. Under this process, the ITAAC elements are agreed upon during the design certification process and in the combined license. They then will be used during construction to determine that the constructed plant conforms to its licensing requirements.

Testing the New Reactor Licensing Process

Through its Nuclear Power 2010 initiative, the U.S. Department of Energy is funding a portion of the costs to support ESP applications now under way. In addition, DOE is partially funding efforts to test the NRC's new COL process. The objective is to demonstrate the new processes so that construction can begin by 2010.

Energy Policy Act of 2005

The Energy Policy Act of 2005 includes a wide range of incentives to encourage new-reactor construction. These include:

- loan guarantees for various forms of new carbon-free generation
- nuclear energy production tax credits for the first 6,000 megawatts of electricity from new advanced reactors at 1.8 cents per kilowatt-hour—a tax credit comparable to that provided wind energy
- a new assistant secretary position within the Energy Department for nuclear energy
- standby insurance, underwritten by the federal government, to protect those companies building new reactors from the risk of regulatory delays and other unforeseen setbacks in advancing first-of-a-kind reactor technology
- authorization of almost $3 billion in nuclear research and development to support such efforts as testing of new licensing processes and the demonstration of nuclear energy to produce hydrogen.

Ten companies or consortia are pursuing combined licenses for as many as 20 reactors. They are expected to file COL applications in 2007, 2008 and 2009.

What Is Driving Interest In New Nuclear Plants?

Several factors are contributing to the growing interest in new

Licensing New Nuclear Power Plants

nuclear power plants: rising electricity demand, clean-air concerns, the performance and reliability of existing plants, and the tight supply—and price volatility—of natural gas. These factors, along with excellent nuclear plant safety and reliability, have contributed to increasing public and policymaker support for nuclear energy.

- ***Electricity Demand.*** The U.S. Department of Energy projects that the United States will need 45 percent more electricity by 2030.

- ***Clean Air.*** Concern about air pollution is leading to increasingly tight restrictions on emissions of sulfur dioxide, nitrogen oxide and mercury. The federal government also may decide to regulate emissions of carbon dioxide, the principle greenhouse gas. Nuclear energy accounts for nearly three-quarters of the U.S. electric generation that emits none of these.

- ***Excellent Performance.*** The nation's 103 nuclear power plants operate at high levels of safety, reliability and affordability. Results from the NRC's reactor oversight process, posted on the agency's Web site, show consistently high safety performance across the industry. The average capacity factor for nuclear plants—a measure of reliability—has remained about 90 percent since 2002. And nuclear plants are the lowest-cost electricity providers, producing electricity for about 1.7 cents per kilowatt-hour.

- ***Price Volatility.*** Nearly all the electric generating capacity built in the past 10 years is fueled by natural gas. The nation has placed unsustainable demand on the natural gas supply, and that means continuing volatility in prices.

- ***Support for Nuclear Energy.*** A national survey conducted in March 2006 found a high level of support among the public for nuclear energy—with 86 percent of those surveyed saying nuclear energy is important for America's future and 77 percent saying the nation should prepare to build new nuclear plants. The survey also found that 73 percent would find it acceptable for a company to build a new reactor at the nearest existing plants. Support among policymakers also is very high, as evidenced by passage of the Energy Policy Act of 2005.

The United States needs a diversified portfolio of electricity sources that includes nuclear energy, renewables (wind, solar and biomass), and clean-coal and natural gas-fired generation. The nuclear energy industry and the federal government are working to ensure that electric companies will have the option of building new nuclear reactors when they need large new power plants. Based on current projections, the United States could have as many as 20 new nuclear plants operational, or near completion, by 2020.

To learn the status of new-plant activities in the United States, go to: *http://www.nei.org/documents/New_Nuclear_Plant_Status.pdf*

This fact sheet also is available at www.nei.org.

FACT SHEET

International Nuclear Energy Activities

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Nine companies and consortia in the United States are pursuing combined construction and operating licenses (COLs) for as many as 20 new reactors, with the first new power plants likely to begin operating by 2015.

Meanwhile, new nuclear energy projects are being developed rapidly around the world. Ten other countries have nuclear plants under construction. In addition, Taiwan is building two reactors.[1]

Twelve countries have plans for 38 reactors. These include Canada's two-reactor Bruce A, which a Canadian utility is refurbishing. And 19 countries, including the United States, have proposed building a total of 115 reactors.[2]

The nations planning and proposing new reactors include countries with few reactors and those with many—such as the United States, which has 103 operating reactors, and France, which has 59. France obtains 78 percent of its electricity from nuclear energy, compared with America's 20 percent, yet France has plans to build a new reactor and a proposal for yet another. Japan, which has 55 reactors providing 29.3 percent of its electricity, is building a new reactor and is planning 12 more.[3]

Highlights of World Nuclear Energy Activities

■ The International Atomic Energy Agency (IAEA) last year forecasted that at least 60 new nuclear power plants will be built during the next 15 years. The IAEA said China plans to build 40 reactors during that timeframe.

■ Finland is building a fifth reactor at its Olkiluoto nuclear plant. Energy consumption in Finland has tripled in the past 30 years. The speaker of the Finnish parliament, Paavo Lipponen, believes the nation needs a sixth reactor to meet its Kyoto Protocol target by 2012.

■ In South Korea, where 20 reactors are operating, four are under construction, and four more are on order.

■ Bruce Power in Ontario, Canada, reached agreement with government officials in October 2005 to launch a $3.6 billion investment program to secure the Bruce plant's long-term future, beginning with the restart of two reactors at Bruce A. Under the agreement, the plants can operate for an additional 25 years. Bruce Power will continue to generate electricity for Ontario until 2035 and beyond—instead of closing its final reactor in 2018 as previously planned.

■ In December 2005, the Ontario Power Authority released a report advising Ontario's minister of energy that the province should continue to rely on nuclear power plants to generate half its electricity for the next 20 years. In June 2006, the provincial government instructed the authority to proceed with this plan.

■ The United Kingdom will spend several months developing a wide-ranging review of energy policy, including the role of nuclear energy in the nation's portfolio. Prime Minister Tony Blair has said the United Kingdom should build a new generation of nuclear plants, and Chancellor Gordon Brown has said he supports Blair's position.

■ Armenian officials met with the IAEA, which offered assistance in conducting a feasibility study for a new nuclear power plant. The nation has one nuclear plant, which

[1] International Atomic Energy Agency, June 7, 2006.
[2] World Nuclear Association, May 31, 2006. Note: NEI estimates for new U.S. reactors would bring that total to 122 worldwide.
[3] International Atomic Energy Agency, May 10, 2006, and World Nuclear Association, May 31, 2006.

International Nuclear Energy Activities

provides 40 percent of its electricity.

■ The Ukrainian cabinet in the summer of 2005 approved plans to build two reactors, which would bring the nation's total to 17.

■ The Wall Street Journal reported in May that the German minister of economics and technology, Michael Glos, said Germany should change the law calling for decommissioning the nation's nuclear power plants because energy supplies are tight. Similarly, the Spanish government is debating whether to fulfill its promise of phasing out nuclear energy, as the country is in the midst of an energy crunch.

■ A Swiss opinion poll points to growing acceptance of nuclear energy as a way to meet the nation's future energy needs. The Swiss Electricity Supply Association said in June 2006 that nuclear energy should remain a significant part of the country's electricity supply in view of projected shortfalls in production expected by 2020.

■ In June 2006, Australian Prime Minister John Howard announced the formation of a new task force to explore nuclear energy's potential role in Australia's energy mix.

This fact sheet also is available at www.nei.org, *where it is updated twice a year.*

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