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# NRC'S REACTOR OVERSIGHT PROCESS

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## HEARING

BEFORE THE

SUBCOMMITTEE ON CLEAN AIR AND NUCLEAR  
SAFETY

OF THE

COMMITTEE ON  
ENVIRONMENT AND PUBLIC WORKS  
UNITED STATES SENATE

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

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OCTOBER 3, 2007

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ONE HUNDRED TENTH CONGRESS  
FIRST SESSION

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<sup>1</sup>Note: During the 110th Congress, Senator Craig Thomas, of Wyoming, passed away on June 4, 2007. Senator John Barrasso, of Wyoming, joined the committee on July 10, 2007.

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## NRC'S REACTOR OVERSIGHT PROCESS

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WEDNESDAY, OCTOBER 3, 2007

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

The committee met, pursuant to notice, at 10 a.m. in room 406, Dirksen Senate Office Building, Hon. Thomas R. Carper (chairman of the committee) presiding.

Present: Senators Carper, Voinovich, Sanders, Isakson, and Alexander.

Also present: Senators Cardin, Inhofe, and Craig.

Senator CARPER. The hearing will come to order.

Welcome to our witnesses, our commissioners, and to our other guests, to my colleagues.

We are going to delay opening statements and are inviting our witnesses on the first panel to testify, in really sort of an extraordinary opening to our hearing today. What we have discussed, Senator Voinovich and myself and Senator Inhofe have discussed, we would like to take a few minutes at the beginning of this hearing to acknowledge the service of your former colleague, Commissioner Ed McGaffigan, and really to celebrate his life and his service to our Country, which spanned something like three decades.

I remember many months ago, Commissioner McGaffigan came by my office to meet with me. I had met with him any number of times, but not often for him just to stop by and to visit. But he came to tell me that his cancer was progressing and that his time with us was, he thought, growing short. He then proceeded to spend the rest of the meeting, though, discussing the issues facing the Nuclear Regulatory Commission and offering his heartfelt advice on what the subcommittee that Senator Voinovich and I are privileged to lead should focus on as the year unfolded.

That meeting was indicative of the kind of public servant that Ed McGaffigan was. When he was faced with really the most sobering personal issue any of us will probably ever have to face, and that is our own mortality, Ed was concerned with making sure that the Commission carried on its mission in serving our Country. Ed's motivation was not to secure his legacy. His desire was simply to see that we did what was in the best interests of our Nation.

Ed literally dedicated his life to serving this Country of ours. He did it with humility, he did it with selflessness, and he was if nothing else, a man of great principle. To his mother, Margaret, to his children, Edward, Frances and Margaret Ruth, I don't know if they go by those names, I just want to offer our deepest condolences on

behalf of myself, our colleagues, members of our staffs and all who knew Ed and who admired him greatly. Ed's memory and his legacy of devotion and hard work, along with his refusal to give up, he was a guy who just never gave up, will inspire me and I suspect many of us for years to come.

To Ed's family, on behalf of all of us, let me simply say, thank you for sharing with us a very good and decent man for these last 30 years. We are in your debt.

With that having been said, Senator Voinovich, if you would like to add your comments, then we will just go down the line to Senator Inhofe and Senator Craig. We will follow all that up with a moment of silence.

Senator VOINOVICH. I had an opportunity to go out to Ed's wake and to express my sympathy to his children and express my appreciation for the sacrifice that they made so that Ed could serve our Country. I think Ed's conspicuous absence among the NRC commissioners here today underscores how he is going to be missed by the Commission.

I think everyone here would agree that Ed's integrity and leadership had a profound impact on the NRC and the industry. His testimony was always refreshing because it came straight out, there was no ifs, ands or buts. He threw the ball right down the middle.

As a result, I think today we are better prepared to face the many challenges that lie ahead. We shall cherish Ed's legacy of selfless devotion to duty and dedication as a model for everyone in Government service. I want to publicly acknowledge a promise that I made to Ed. He came to me on a couple of occasions and he said, Senator, I really appreciate the time and effort that you put into the Nuclear Regulatory Commission. He said, I want you to promise me that you will continue to pay attention in terms of reform and in terms of improving the NRC, so that we can have a renaissance in nuclear energy in the United States of America. I want to publicly state that I am going to keep that promise.

Senator Inhofe.

Senator INHOFE. I cannot really build too much on what has already been said. I agree with Ed, I think the sad thing is about his legacy is that Ed is not here to see the new reactor licenses get filed and observe the impact of his efforts. It was 10 years ago that I became the chairman of this subcommittee, and at that time, the NRC had gone something like 12 years without any oversight. You just can't do that in Government. So we started having oversight.

The only one who was there at that time who is currently serving was Ed. Ed welcomed, I always remember, sitting at that table, he said, we need the oversight. He said, you can't do it without the oversight. So he was one of them who was instrumental in getting the oversight necessary to really start progressing and getting into the nuclear field, which we all understand is going to be an essential part of resolving the energy crisis we have in this Country.

So I just join my colleagues in saying that he was a wonderful guy to be with and to work with, but essentially, he was the one in on the beginning of this resurgence of activity in nuclear energy. We will miss him.

Senator CARPER. Thank you, Senator Inhofe.

Senator Craig, would you like to make a comment?

Senator CRAIG. Mr. Chairman, thank you very much for taking this time to recognize Ed. I don't think any of us think about how our epitaphs out to be written or how our gravestones ought to be carved. But my guess is that a phrase that might be fitting for the commissioner would be, "He served until he could serve no more." And he did that. He did that for the greater public interest in a way that all of us ought to recognize and to praise him for, as my colleagues have done. Not only did he bring integrity to the name of service, but he literally served until he could serve no more. In doing that, it is important that this committee recognize it, that we have the responsibility, Mr. Chairman, to have a full complement of commissioners so that Ed's dream of a renaissance in the nuclear industry can be fulfilled in a responsible way that the public is confident that the work done at the Commission is done with the integrity that Ed set forth with his years of service there.

So it is phenomenally fitting this morning before the right committee, the committee of responsibility, recognizing the need to fulfill our charges, that we deal with the commissioners that are before us now as it relates to confirmation, there will be another one coming as a result of Ed's death, and that we do so in a way that the Commission can serve the public in a way that it has historically served, and sustaining the kind of confidence that has always been the hallmark of the Nuclear Regulatory Commission.

So thank you very much, Mr. Chairman, for doing this. I think a moment of silence for Ed at this moment is so fitting and appropriate. Thank you.

Senator CARPER. Before we have that moment of silence, let me call on the commissioners to add any brief comments that they would wish to add at this time. Chairman Klein.

Mr. KLEIN. Thank you, Mr. Chairman, members of the committee. We held a memorial for Commissioner McGaffigan yesterday at the NRC for those members of the staff that could not attend his funeral and pay their respects. But not only to pay their respects for his life, but also for his accomplishments. His family was there, his daughter, his brother and sister. His mother could not make it, and unfortunately, his son Eddie was unable to attend due to health reasons.

It was really, I think, a moving moment for all of us, both the staff and my fellow commissioners and I, and several former commissioners also attended as well as former chairmen of the Commission. I think we all had our own stories to tell, and I was proud to say, from my standpoint, that while we were colleagues, we also became friends. I think that is very important for a collegial body to work on common good to protect the public environment and public safety.

In terms of Ed's situation, he left this life the way he wanted to, intellectually strong and fighting until the last minute. There were issues he was dealing with until the very end, and as indicated, his epitaph would say that he served until he could no longer serve.

It was a comment that all of us, I think, had commented on, as Senator Voinovich made, Ed called it like he saw it. He didn't play games, he told it like he saw it, just up front and factual and based on facts. Honesty, integrity, hard work. I think all of us will miss his leadership, his long service and his dedication to public service.

I think the best thing that the NRC can do and the commissioners is to follow his example, work hard, do the right things, base our decisions on facts. The Commission lost a hard worker and a good man.

Thank you.

Mr. JACZKO. I think that was very eloquently spoken by the Chairman. I would only add, I think, that I certainly want to associate myself with his remarks, that Commissioner McGaffigan, while, as Senator Craig said, he worked until he worked no more, I think his work will continue at the agency, and I think that is something that we all know and recognize, that he has established principles that will guide us, and he has established programs and regulations in a wide variety of programs that will continue to be a part of this agency. He has a dedicated core of alumni staff who will continue to make contributions to this agency that were guided by his dedication and his influence.

So I think we will have the pleasure of his memory with us for a long time at this Commission.

Senator CARPER. Thank you, Commissioner.

Mr. Lyons.

Mr. LYONS. I counted Ed as a friend and a colleague for about 25 years. Ed's focus on excellence at the NRC truly inspired his colleagues to re-examine their own commitment to excellence of that organization. He consistently took on the most difficult challenges that we had at the NRC. He took every opportunity to improve the accuracy of impressions about the agency and at the same time, he worked tirelessly to improve the quality and timeliness of our products. He certainly never hesitated to tell us internally where we needed to improve. That was true of staff and commissioners.

As long as I knew Ed, he truly exemplified the ideal for a public servant. He frequently referenced words of President Kennedy as being a particular inspiration to him in his public service. I think it remains for those of us remaining at the Commission and at the agency to strive toward the high standards that he set for all of us.

Senator CARPER. Thank you all for those comments. I will call on Senator Isakson at this time.

Senator ISAKSON. For just a minute, I want to share my condolences on the passing of Ed McGaffigan, and associate myself in particular with what Mr. Lyons just said regarding the epitome of a public servant. I think we have all benefitted as a Nation from his time and talents given to the Commission. I think as was said by Mr. Jaczko that his legacy will go on and live for a long time because of his great work. I appreciate very much the tribute each of the commissioners have made today.

Senator CARPER. Thank you very much.

I am going to ask each of you to join us in a moment of silence as we remember Ed in our own way and give thanks for his remarkable service to this Country.

[Moment of silence observed.]

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

Senator CARPER. Thank you.

Today's hearing is on the NRC's Reactor Oversight Process, and whether it adequately ensures the health and safety of the American Public. Our Senators are going to have 5 minutes or so for their opening statements, then we will recognize the Chairman and commissioners to offer their statements to the committee. Chairman Klein will be given 5 minutes and the other commissioners roughly 2 minutes to offer any additional thoughts that you might for us.

Following the commissioners' statements, we will have two rounds of questions and then we will invite our second panel of witnesses to come forward. I think we are going to be interrupted by a vote around 11 o'clock, but maybe we can get through your testimony and at least one round of questions, and we will see how far we can go beyond that.

Last week, along with several of my colleagues that are here today, we celebrated the submission of the first license application for I guess over 30 years to build and to operate a new nuclear reactor in the United States. For us, I think that is a big deal. What is even more exciting is that the application is the first of several that are expected to be submitted by the end of this year and possibly dozens more are expected to follow in the next 18 months.

Senator Voinovich and I have been working over the past years, as our predecessor, Senator Inhofe and others have, to make sure that the Nuclear Regulatory Commission is ready for this nuclear renaissance. We will be watching very closely as these applications begin to wind their way through the review process at the agency. If all goes well, we will have the first of possibly 30 new reactors built within the next 7 or 8 years.

While that one reactor 7 years down the road is important, the 104 reactors currently operating in the United States must remain the agency's top priority. If any one of our current reactors fails to operate safely, it will undermine the nuclear resurgence and renaissance that we are currently seeing and celebrating. The reactor oversight process is a cornerstone of the NRC's reactor safety program. Today we are going to discuss its effectiveness.

The reactor oversight process was developed to provide a more predictable and consistent regulatory framework for the nuclear industry. At the same time, it is intended to give the public a more understandable and accessible assessment of plant performance. I believe the reactor oversight process has fulfilled those two objectives.

Having said that, I want to discuss a third aspect of the NRC's mission, and that is prevention as well as correction of problems. NRC's action matrix categorizes individual reactors according to their performance. If a plant's performance degrades or deteriorates, the NRC increases its inspections. The NRC has identified seven key processes or cornerstones, I think you called them, that are necessary for safe operations of a plant. There are currently 10 reactors in NRC's column three, and that is the degraded cornerstone column. There is also, I think, one reactor in column four, and that is the repetitive degraded cornerstone column. This means that 11 reactors across our Country are having significant problems in the areas of their plant that are deemed to be necessary for safe operations.

For my questions today, I want to hear what the NRC is doing to address these issues at those 11 plants. More importantly, I want us to find out if the reactor oversight process provides the proper tools to ensure that the plans in column three improve in a timely fashion instead of continuing to degrade.

There are also plants that continue to have relatively minor problems which do not seem to go away. I remember in 2004 and 2005, when the nuclear reactors nearest to my State, right across the Delaware River in New Jersey, Salem and Hope Creek, had an outage or some sort of leak or problem it seemed like almost every day. It wasn't, but it seemed like almost every day. They have cleaned up their act considerably since then, in no small part because of your oversight.

Those plants have greatly improved over the past few years. But now, the same sort of situation seems to be occurring in New York's Indian Point Nuclear Plant. It is important that the NRC continue to monitor and work to quickly resolve these problems to ensure all plants are functioning safely and reliably. With that having been said, let me recognize Senator Voinovich for his comments, and the others as they have arrived.

Senator Voinovich.

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

Senator VOINOVICH. Thank you, Senator Carper. Today's hearing does continue the strong oversight of the Nuclear Regulatory Commission that began in 1998 when Senator Inhofe was Chairman of the subcommittee. I think you were Chairman of the subcommittee in 1999 and 2000, too.

Senator INHOFE. I was.

Senator VOINOVICH. Then I took over as chairman and worked with Senator Carper all those years, now I have the privilege of being a ranking member and Senator Carper is the Chairman of this subcommittee.

We have focused a great deal of time on this, overseeing safety and security in the 104 currently-licensed powerplants. We have also worked hard to make sure the NRC has what it needs in terms of regulatory reforms, human capital and other resources to gear up for the nuclear renaissance.

The first milestone toward the nuclear renaissance was achieved last week with NRG's submittal of a COL to build two new nuclear reactor plants in southern Texas. For the first time in almost 30 years, NRC will be faced with the challenges of approving applications for new powerplants. Four more applications by the end of this year, we understand, followed by 14 more next year, for a total of, I think, 30 new reactors. Unbelievable. That is why we held three NRC oversight hearings last year, to ensure NRC is aggressively preparing for this daunting challenge. Senator Carper and I have agreed to schedule another oversight hearing early next year to focus on the GAO's recently-released report on NRC's licensing process and its readiness.

As I mentioned, at the last NRC hearing in April, Developing Domestic Nuclear Supply Chain Infrastructure, human capital remains a significant challenge to making the nuclear renaissance a

reality. So in addition to holding these oversight hearings, Senator Carper and I are planning a roundtable meeting with the leaders of the Federal, State and local governments and other stakeholders, such as industry, academia and labor unions, to address these other challenges, particularly the human capital challenges.

More than ever, the NRC must provide regulatory certainty and predictability 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 intend to increase our Nation's use of nuclear energy. I can say that I have been working 7 years, but I remember Davis-Besse, I am from Ohio, and going through that, that was not an easy period, but I think a period that we learned.

So we are going to place emphasis today on NRC's reactor oversight process, because we know how important that is. Thank you, Mr. Chairman.

Senator CARPER. Thank you.

Senator Inhofe, and then we will turn to Senator Sanders.

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

Senator INHOFE. Thank you, Mr. Chairman. I am glad we are having this, we always say that, but I really mean it. The time is right, and we are making a breakthrough, as referred to as a transformation or as Senator Craig and Senator Voinovich said, a renaissance.

Truly, that is what is happening right now. One key element of that transformation was the reform of the NRC's reactor oversight process. The old process was subjective, it was inconsistent, it was bureaucratic. The reforms put into place in 2000 have established a more safety-focused process that is actually measurable. Even the GAO found the proceeds to be logical and well-structured, in that the process causes the industry to constantly improve.

The GAO also found it to be a very open process, which provided the public and other stakeholders considerable information on its activities. The very nature of requests for the so-called independent safety assessments implies that the NRC's oversight is inadequate to ensure safety and is somehow biased. The NRC was established by law as an independent agency. If the integrity of the agency is in question, then I am eager to hear that evidence. But if the reactor oversight process is deficient in some way, then I would also like to know that, so it can be remedied.

As I understand it, the NRC is moving to address a few weaknesses highlighted by the GAO. I have to say, Mr. Chairman, that the GAO was pretty good in this report. It wasn't highly critical. There were some positive suggestions. I don't think there was a member of this committee or the Commission that doesn't agree that we need to constantly look for improvements.

I am also interested in their conclusions about the NRC's readiness to review new plant applications. In fact, I am going to have, since I have a conflict today with the Senate Armed Services Committee, I probably will be submitting some questions for the record, just to be sure that the capability is there to meet a rather aggressive schedule. Because I can't think of anything that is going on in

any of the committees that is more significant than this renaissance that we are addressing today. So I applaud you for having this hearing and I am looking forward to having the information that comes from it.

[The prepared statement of Senator Inhofe follows:]

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

REMEMBERING COMMISSIONER ED MCGAFFIGAN

I am very disappointed that Commissioner McGaffigan is not here with us today. For more than 10 years, I have appreciated his frank and insightful testimony before this Committee. Ed and I shared a common goal to transform the Commission into a more effective and disciplined agency and I have had the greatest respect for his tenacious efforts. The results are a remarkable and an admirable legacy. The sad thing about this legacy is that Ed is not here to see new reactor licenses get filed and observe the impact of his efforts as the NRC meets this new challenge. He will be sorely missed.

Thank you, Senator Carper and Senator Voinovich, for holding this hearing today. I am a firm believer that constant oversight is critical to ensuring that federal agencies are productive and efficient. The NRC is a solid example of how oversight by this Committee over the last 10 years transformed the agency from a subjective and unpredictable regulator to a more safety-focused, efficient one.

One key element in that transformation was the reform of the NRC's Reactor Oversight Process. The old process was subjective, inconsistent and bureaucratic. The reforms put in place in 2000 have established a more safety-focused process that is measurable. Even the GAO found the process to be logical and well-structured, and that the process causes the industry to constantly improve. The GAO also found it to be a very open process which provided the public and other stakeholders considerable information on its activities.

The very nature of requests for the so-called "Independent Safety Assessments" implies that the NRC's oversight is inadequate to ensure safety and is somehow biased. The NRC was established, by law, as an independent agency. If the integrity of the agency is in question, then I'm eager to hear the evidence. If the Reactor Oversight Process is deficient in some way, then I'd also like to know that so it can be remedied. As I understand it, the NRC is moving to address the few weaknesses highlighted by the GAO. I look forward to the testimony today on these issues.

I'm also interested in the GAO's conclusions about the NRC's readiness to review new plant applications. Last week, NRC filed a license application for 2 new plants in Texas. I hope this is the first of many to come. However, this surge of applications presents a significant challenge to the NRC's ability to manage its workload. In the effort to balance existing responsibilities with new plant licensing reviews, I am concerned that the NRC may not have all the tools in place that it will need.

During its review of Early Site Permits, the NRC was caught flat-footed because it underestimated the number of public comments and was unprepared to manage volume of work. Similarly, as the agency begins to review license applications, I'm concerned that some important management processes are not in place. Without clear processes for prioritizing resources and tracking Requests for Additional Information (RAI's), I am concerned that the agency will soon find itself fully engaged in reviewing multiple applications without having all the necessary tools in place. I look forward to hearing Chairman Klein's testimony on how the NRC is addressing these and other issues reported by the GAO.

Senator CARPER. Thanks, Senator Inhofe.

Welcome, Senator Sanders. You are recognized.

**STATEMENT OF HON. BERNARD SANDERS, U.S. SENATOR FROM THE STATE OF VERMONT**

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

It seems to me that at a time when public confidence in the Government is not terribly high, we have to do everything that we can, we have to go the extra mile to make sure that the public is assured that when it comes to nuclear power, we have done everything, everything that we can to assure that these plants are as

safe as they can be. This is especially true when it comes to the fact that we have a number of aging plants, including the plant in Vernon, Vermont, which are now coming up and where there are now requests to extend the life of those plants.

According to the September 2006 GAO report on nuclear oversight, from 2001 to 2005, NRC issued five red findings, that is the worst kind, and seven yellow findings, which are just below red in terms of seriousness in violation. The red findings involve Steam Generator 2 failure, auxiliary feed water pump problems, and the well-known Davis-Besse football-sized hole in the reactor vessel head caused by acid corrosion, which is, needless to say, a very frightening occurrence.

Problems happen when nuclear powerplants get old. When plants try to increase their power, that obviously puts more stress on already aging nuclear plants. Some nuclear plants may be seeking a 20-year license extension and some may be seeking both a power up-rate and a license extension. People who live in areas where these plants are extending, want to extend their lives and their up-rate, have reason to be concerned. Our job is to do everything we possibly can to assure those people that we are safely inspecting those plants.

That is why I have introduced S. 1008, legislation which becomes more relevant in my own State of Vermont with the recent problems that we have seen at Vermont Yankee, including a cooling tower collapse. I think we have a poster over here, this is what happened within the last couple of months at Vermont Yankee, as well as other problems. S. 1008 allows a State's governor or public utility commission to request an independent safety assessment if they have a nuclear plant in their State. If a State is in the emergency planning zone for nuclear plant in the State nearby, they certainly have an interest in these issues as well.

That is why my legislation would allow them to make the same request. In other words, God forbid there is a nuclear problem. It is not only going to impact one State, other States should be allowed to have input into the inspection process. In my situation in Vermont, that includes New Hampshire and Massachusetts as well.

Mr. Chairman, critical times at nuclear plants call for special inspections, both to ensure the public safety but also to boost public confidence. When a facility is seeking a power up-rate, which is an increase in the power it is allowed to generate, as was recently approved for Vermont Yankee, that is a critical time. I have to tell you that in the State of Vermont, there is concern. Forty-year-old plant, they want another 20 years. They want a 20 percent increase in their output. People are concerned, not only in Vermont, all over this Country. We have to go the extra mile to make sure that there is public input and the most thorough inspection process possible.

I think, and again, I certainly do not mean to be critical of the people up here or the NRC, but people are concerned about the degree to which the NRC is pro-industry, is not listening to legitimate concerns that ordinary citizens have. Essentially what our legislation does is, it goes beyond the NRC, brings independent inspections. It really is. There is nobody up here who wants anything less

than the most safe nuclear powerplants that we can have. There is no disagreement.

I would hope that we can support that legislation which does that.

Mr. Chairman, I ask that a copy of the Monday, October 1, 2007 Keene, New Hampshire Sentinel editorial be made a part of the record.

Senator CARPER. Without objection, so ordered.

Senator SANDERS. Thank you.

This details the lack of public confidence in Vermont Yankee from our neighbors in New Hampshire, including the 2004 vote of the New Hampshire Senate, which I believe at that point was Republican, if I am not mistaken, I might want to mention, calling for an independent evaluation of the Yankee Nuclear powerplant and the two New Hampshire Congressmen have also co-sponsored this legislation.

So Mr. Chairman, that is my request. When you have plants that are old that want to expand, that want to increase input, we have to go the extra mile. We have to assure the public that these are safe plants, and I would hope that we would support that legislation.

[The referenced material follows:]

Monday, October 01, 2007

## VY's future

Monday, October 01, 2007 The Keene Sentinel

Should Vermont Yankee be granted a 20-year extension of its operating license so it can continue generating electricity until 2032?

The aging nuclear plant is in Vernon, Vermont, on the shore of the Connecticut River. Five New Hampshire towns — Chesterfield, Hinsdale, Richmond, Swanzey and Winchester — are in its 10-mile emergency evacuation zone. But a catastrophic accident at the plant could doom the entire southwestern corner of New Hampshire. So recent events there and questions about the future are of local interest.

Early in August, plant officials assured the public that a bunch of new cracks in the plant's stainless steel steam dryer were no big deal. Earlier inspections had found many other cracks. Similar problems have been found in other plants of the same design. Vermont Yankee's cracks, we were told, were not related to the 20 percent power uprate that the ever compliant federal Nuclear Regulatory Agency granted the plant last year. Instead, the cracks were due to stress fatigue from normal aging.

That's not entirely reassuring.

A few weeks later, on August 21, press reports indicated that Vermont Yankee had reduced its power output after the staff detected something wrong with one of its cooling towers. An NRC spokesman assured everyone that the problem "does not affect the safe operation of the plant."

An Associated Press story published August 22 quoted Arnie Gundersen of Burlington, Vermont, a former nuclear industry engineer, suggesting that the tower problem resulted from the increased water flow required by that power uprate. He said the type of towers used at Vermont Yankee had been prone to collapse at other power plants.

As we soon learned, that's just what had happened at Vermont Yankee. A tower had collapsed. But the Vermont public service commissioner reassured everyone. "We do not see any other evidence of problems of the sort that occurred the other day," he said.

Of course, it's often what you don't see that can hurt you, as was pointed out by Uldis Vanags, the state of Vermont's nuclear engineer. In an e-mail to Vermont Governor Jim Douglas, Vanags wrote: "The root cause evaluation is revealing that the inspection of the towers has not been adequate. Portions of the columns where the fill is stuffed are not visible unless the fill is removed and some of these areas are showing degradation requiring repair." Unlike Gundersen, Vanags did not blame the collapse on the power uprate. He blamed rotted wood and rusting steel bolts.

In other words, more of your normal aging.

A subsequently leaked memo from Bill Maguire, the general manager of plant operations, reported that Vermont Yankee workers could have been killed in the collapse had a roof fallen in with them on it. "The extent of degradation of the tower cell was not fully

known" when the workers were up there, Maguire wrote.

Nine days after the collapse, Vermont Yankee experienced an automatic shutdown. By all accounts, this was the result of an unrelated problem, a poorly lubricated valve. But an NRC spokesman said that the NRC still didn't know what caused the tower collapse. "We're still waiting for a root-cause evaluation and an extent of condition review," he said.

Well, let's hazard a layman's guess. Could the collapse be related to the fact that this old nuclear plant seems to be falling apart?

Let's find out. For years now, the New England Coalition has been asking the NRC for an independent safety review of the plant, and the NRC has been saying no. In 2004, the New Hampshire Senate also urged an independent evaluation of Vermont Yankee. Nobody paid any attention to that either.

Now, however, Vermont Congressman Peter Welch and Vermont U.S. Senator Bernie Sanders are pushing for a federal law that would allow governors to require independent reviews of nuclear plants before license renewals or power upgrades could be granted. "Vermonters are entitled to an objective assurance that the facility is safe to operate," Welch said.

Yes, and so are the New Hampshirites who live along the water's edge and share the current uncertainty. So it's encouraging to note that this state's two U.S. representatives have signed on to Welch's bill. As 2nd District Congressman Paul Hodes put it in a statement: "An exhaustive safety inspection would alleviate anxiety in the region." Or confirm its validity.

As for New Hampshire's two U.S. senators, they have not replied to recent requests from this newspaper for comment about Vermont Yankee safety issues. But in 2006, they both did say that they believed the matter should be left up to the NRC — which is expected to rule on the Vermont Yankee license extension as early as next month.

Senator CARPER. Senator Sanders, thank you for that statement. We are going to turn to Senator Craig, Senator Isakson and Senator Alexander, in that order, please.  
Senator Craig.

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

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

Commissioners, welcome before the committee today. I have spent a lot of time on nuclear energy over the years, but not on this committee, on the authorizing committee, as we have done so, and the renaissance we are now engaged in that is clearly at your doorstep is a product of the 2005 National Energy Policy Act that all of us, I think, are very proud of.

For just a moment, let me relate a little history and why there is an intensity of my interests, and I am thinking when Senator Sanders had his picture up, what is the picture I would want to put up? Maybe it would be Chairman Boxer's picture of melting icebergs and a reality that we have to have a reliable, clean source of energy for this great Nation, and that clean source as we know it today is nuclear, it is a renaissance we speak of. It is something that clearly you, gentlemen, and those who work with you, are going to have a phenomenal responsibility for.

In my service here in the Senate, it wasn't long ago where a utility that had an aging nuclear reactor and a generating facility thought they had an albatross on their hands. Thanks to you, thanks to the Commission, thanks to relicensing and retrofitting and modernization, those plants have a new life, and most utilities are finding that to be the most profitable generating facility they have today. Of course, it does comply with the politically correct concern we all have about clean energy.

So what happened? Well, in 1946, we created the Atomic Energy Commission. In 1949, out in the deserts of Idaho, EBR-1 began to be assembled, the first experimental breeder reactor. In 1951, the first light bulb was lit from that reactor's generating capability. Fifty-two experimental reactors later, at the Idaho National Laboratory, we have played a critical role, along with the Atomic Energy Commission, soon, well, not so soon, 1974, I believe, to transform itself into the Nuclear Regulatory Commission.

But there was a symbiotic relationship of cooperation and understanding and working together. We are all intent on that.

So to you, Mr. Chairman, and to Senator Voinovich and Senator Inhofe, and your insistence on a cooperative oversight kind of thing, citizens of Idaho want that also. We are potentially the recipient of the new design, the next generation nuclear plant could well be built experimentally in Idaho, and done so in a way that is going to be hand in glove with all of the work that you do in making sure that what we get done is right.

Now, that first license, Mr. Chairman, that we celebrate here today that occurred last week is the beginning of not hundreds of millions, but hundreds of billions of dollars of investment in the energy flow for this Country if what happens downstream, as Senator Voinovich has talked about, 30-plus reactors later, that becomes reality. We must get right from day one the concerns that Senator

Sanders speaks of that we are all critically concerned of that you are responsible for. There is no just no question about it.

To build the confidence in 1 and 2 and 5 and 10 and 30 reactors, and there is no reason to think we can't do that, because we have done it very, very well in the past, is what will breed not just the renaissance of energy in this Country, but it could potentially be as important to this economy as was the new high-tech renaissance that we began to experience a couple of decades ago.

So if I speak in those terms, I mean to. Because the responsibility of the NRC and the importance of this committee and the oversight and the hand in glove relationship that has to come from now and into the future, to get it right, to sustain the confidence of the American people as it relates to nuclear energy generation capability is going to be critical to hundreds of billions of dollars of investment and new jobs and new thinking, great creative talent that will be released upon this economy and this Country by these actions.

Thank you, gentlemen, we are glad you are here.

Senator CARPER. Senator Craig, thank you.

Now Senator Isakson, Senator Alexander, then Senator Cardin.

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

Senator ISAKSON. Thank you very much, Mr. Chairman. I want to initially echo your remark about the importance of this hearing and the importance of the responsibility of the Commission at the beginning of this new renaissance in terms of nuclear energy.

In the 1970s and 1980s, when we were beginning to have a real growth in nuclear energy capacity and nuclear energy production in terms of the electricity market, Chernobyl and then Three Mile Island caused a huge setback, which set us back for the better part of three decades. We talk today, many talks, everybody talks about the carbon issue, the warming issue, and everybody talks about ways to reduce fossil-based carbon emissions into the atmosphere. There is no question, especially from those of us in the south, that the only way and the best way to be able to meet the standards we would all like to have is to be able to have safe, reliable nuclear energy and capacity.

As Senator Alexander so eloquently spoke, we debated the Energy Bill on the renewable portfolio standards. There were many in Congress who wanted us to reduce our emissions by 15 percent using wind or solar. Well, that works fine in some parts of the United States, but in the south, we don't have the wind to turn the turbines, and you can't put enough solar capacity to reduce by 15 percent.

But we also happen to be a part of the Country that has successful, long-time, safe and reliable nuclear energy production. I cannot tell you, I don't think there is a commission of the United States Government on any subject that has a more important responsibility than you do in this century. Because if we are going to meet the challenges of our environment, meet the challenges of our economy, continue to compete in the world we are in today, we must do it with reliable, safe and effective energy. Nuclear is an important component part of that generation.

So I am delighted that we are having this hearing today. I am delighted that you are here today. I am delighted, quite frankly, on the job the Commission has done from the outset. I find no fault, personally, because we have nuclear generators in Georgia, every appearance I see you are very diligent, to the most minute detail, when it comes to safety. Call people quick and get responses quickly. The public needs to know that.

As this renaissance takes place, if your attention to safety continues as it has, then the generators and those that generate electricity in this Country continue their commitment to safety, we will solve many of the problems that today people think are either not solvable or not possible to reach. I commend you on what you do, for your work, and thank you for being here today to testify.

Senator CARPER. Thank you, Senator Isakson.

Senator Alexander, good morning.

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

Senator ALEXANDER. Thank you, Mr. Chairman. Thank you for a few moments.

I have wondered, almost half facetiously over the last few years whether if what we should do as a Nation is simply build about 100 stripped-down aircraft carriers that are nuclear powered and just park them all around the Country and plug them into the grid. We have never had a single nuclear accident since the 1950s, and that might be the fastest, easiest, simplest way to have long-term, reliable, low-cost clean energy.

I am delighted with this hearing. I am looking forward to some comments about safety. I applaud the Nuclear Regulatory Commission for changing its official use policy, at least insofar as it affects nuclear fuel services in Tennessee. There was a spill there. The official policy of the Government was that information about that spill was limited in the ability to disseminate that to the community. You have now changed that policy, a few weeks after a visit I made there. I think that is right for our Country and it is the right balance and I appreciate your doing that.

Second, I hope to hear more about the disposal of low-level radioactive nuclear materials. We have, for example, St. Jude's Hospital in Memphis. Children come there from all over the Country every year with cancer. There are 5,500 radiological treatments every year. Our State, when Barnwell, SC closes, won't have a place to send its low-level radioactive waste. I would like to hear your comments about other options for that and whether we can encourage ways of compressing and reprocessing that kind of waste so it can be stored.

In the remaining few minutes, I wanted to just make this observation about nuclear power. When we drafted the Energy Bill in 2005, there were nearly 200 amendments, and not a single one was an anti-nuclear amendment. We all remarked on that, about what a change in attitude that was in our Country.

To put it in practical terms, if I were chairman of the Tennessee Valley Authority, which I am not, which is the largest utility in the Country, and I were looking at the future, I would have been told by my staff that we need 700 new megawatts of energy a year.

That is more than a gas plant, less than a new nuclear plant, a lot of electricity. I would have spent August buying 6,000 extra megawatts a day because of the heat wave, most of that coming from gas.

If I were looking at my options, I would see the natural gas prices are \$7, maybe going up, not such a good option. I would look up here at Congress, and we are stiffening the laws on clean air, so that means coal plants, which are 62 percent of my electricity, are under some pressure. If Congress caps carbon, as I think it should, in some reasonable way over time, then according to the Energy Information Administration, there will be 100 new nuclear plants before 2030. Even according to the natural gas industry, there will be 26. According to the Nuclear Power Institute, there will be 46.

So there is going to be an explosion of nuclear plants over the next 30 years in terms of growth and in terms of capacity. We want to make sure that safety is paramount in that.

As I am chairman of the TVA board, or if I were, in looking at my options, I would see that carbon recapture is not quite ready for coal. I would see that wind and solar are not really alternative energies in our region. There is only one wind farm in the south-east, and on a hot day in August, only one turbine was turning on a day when we were buying 6,000 extra megawatts of power.

So TVA did the only thing it could do. It opened the Browns Ferry Nuclear Reactor in May. That is 1,110 megawatts. It approved Watts Bar 2 for building in 5 years. That is another 1,100. It has an application in for Bellefonte. That is another large nuclear plant.

Seventy percent of our clean energy in America is nuclear, even though it is only 20 percent of the production. It looks to me like if we are really serious about clean air, if we are really serious about climate change, if we are really serious about having large amounts of low-cost, reliable power, so our jobs can be competitive here, then our only real options in the near term are conservation, about which we should be much more aggressive, and nuclear power.

It is absolutely critical that we do our job in oversight with you as you do your job in oversight, to assure the people in our region that this growth of nuclear power can be as safe as it has been in the United States Navy since the 1950s when there have been, I guess, a classified number of ships and a classified number of reactors. But we know for sure that there has never been a nuclear accident since that Navy was put on the water.

So thank you, Mr. Chairman, for this opportunity.

Senator CARPER. Senator Alexander is a 23-year veteran of the U.S. Navy. I want to thank you for that opening statement.

Senator Cardin, we are glad you are here. Welcome.

**STATEMENT OF HON. BENJAMIN L. CARDIN, U.S. SENATOR  
FROM THE STATE OF MARYLAND**

Senator CARDIN. Mr. Chairman, first, thank you for your courtesy to allow me to sit in on the subcommittee today. This is an extremely important subject, and I thank you very much for holding this hearing.

I want to agree with my colleagues, our energy policy in this Country, which we are struggling with right now, some legislation that is moving through the Congress, is aimed at trying to make this Country energy-independent. That is our goal. It is important to be energy-independent for national security. We don't want to have to deal with countries halfway around the world where we disagree with their policies because we need their oil affecting our foreign policy. So we need it for national security.

We also need it for economic reasons. We need to have a reliable source of energy, so that those economic aspects of our economy are not again dependent upon what happens because of our dependency on oil.

Then our energy policy must be sensitive to the environment. We need to rely less on fossil fuels and those energy sources that emit greenhouse gases. I think this committee is particularly sensitive to that aspect.

So for all those reasons, nuclear energy is a critical part of our energy discussions. In my own State of Maryland, we rely upon nuclear power sources for 28 percent of our electricity. We fully anticipate that number may well go up. So it is a very important issue and one that I am very much committed to working on with the members of this committee and the Senate, so that we have a responsible energy policy in this Country.

Having said that, I am very concerned about safety. What happened at Peach Bottom Nuclear Plant is unacceptable, it is outrageous, where the security people literally fell asleep on the job. That plant is located in Pennsylvania, just a few miles from the State of Maryland and affects the safety of our entire region. So I hope, Mr. Chairman, that our witnesses today will talk about that and talk about steps that are being taken to make sure that that never happens at a nuclear powerplant in our Country, that we have security to protect us from potential harm.

So I appreciate this hearing, because I do think it is critically important that we have the right energy policies in this Country, including nuclear, and that we assure the people of our Nation that will take steps to make them as safe as we possibly can in regards to any of our energy production.

With that, Mr. Chairman, I will look forward to listening to the witnesses.

Senator CARPER. Thank you, Senator Cardin. We are glad that you could sit in with us.

In welcoming our first panel of commissioners, let me just, I am moved to just say one more thing before I recognize them. Senator Inhofe said roughly a year or so ago he began holding oversight hearings. I think he said it had been some time, many years before, during which hearings were not held. If you think about it, going back a decade or so, and looking at today, today, I don't know if a decade ago we would have thought oil would be \$80 a barrel. It is. A decade ago I don't know that we would have anticipated the Nation's trade deficit being three quarters of a trillion dollars. It is. A decade ago I don't think we would have thought much about the prospects of finding a new Northwest Passage. But apparently this summer, one has opened up.

A decade ago, we thought a lot about cars, trucks and vans. I don't know that any of us were thinking much about the future of plug-in hybrids, and the folks at Chevrolet are hoping to have the Volt on the roads in about 2 or 3 years. It is going to be running on electricity. My hope is that there will be across this Country a lot of cars, truck and vans that are running on electricity. We have to find it from some place.

The stakes are high for our Country in getting it right with respect to this nuclear renaissance. The stakes are very high. There is little room for error. I think each time that you have come before us, I have always said, if it isn't perfect, make it better. Everything that I do, everything that we do, we know we can do better. That has to be true in this case as well.

If we get this right, the application process, bringing on the new capacity, making sure that the folks that are out there running these 100 plus reactors today are minding their Ps and Qs every single day, if we get this right, it bodes well for our Country. If we don't get it right, we have a severe price to pay. We have to get it right.

With that having been said, Chairman Klein, we welcome you and you are recognized for 5 minutes. Your full statement will be made part of the record. Thank you.

**STATEMENT OF HON. DALE E. KLEIN, CHAIRMAN, U.S.  
NUCLEAR REGULATORY COMMISSION**

Mr. KLEIN. Thank you, Mr. Chairman, members of the committee.

It is a pleasure to appear before you today with my colleagues, Commissioners Jaczko and Lyons. On behalf of the Commission, I thank you for your continued support of the NRC's important work.

I would like to focus on a few specific developments that have occurred since the Commission last appeared before you in April. But first, let me just again comment briefly, this is the first time that we have appeared before you without Commissioner McGaffigan for some time. He will certainly be missed.

As you know, we are entering a period of greatly increased activity at the NRC. Last week, we received the first of five full applications that we believe will arrive within this calendar year. Over the next 18 months, we expect to receive about 20 applications for about 30 reactors. We believe that as a result of our planning efforts, the NRC has the skilled workforce to complete thorough reviews in a timely and effective manner.

Our readiness is broadly confirmed by the Government Accountability Office draft report on the reactors that was released in August. The report accurately identifies both the accomplishments and the challenges that the agency faces in new reactor licensing reviews.

Mr. Chairman, let me turn for a moment to the NRC's inspection program currently with our licensed reactors. At the April hearing, some members of the committee asked for more information comparing the independent safety assessment inspection conducted at Maine Yankee in the mid-1990s to the current risk-informed, performance-based reactor oversight program. My written testimony

discusses this in some detail, but let me just say a few comments about the independent safety assessment in the 1990s.

While that was an important tool at the time, the Commission believes that today's reactor oversight process is far more superior and effectively incorporates the elements of the Maine Yankee independent safety analysis while providing more rigorous and thorough continued evaluation. The reactor oversight program is an independent safety assessment.

Mr. Chairman, my written testimony also addresses the NRC's response to two matters of concern that have arisen in recent months. The first is the GAO investigation into materials licensing in which the GAO created a fake business in order to obtain a radioactive materials license from the NRC, and then altered that license in order to purchase larger quantities of radioactive sources than were authorized.

The second issue is the March 6, 2006 incident at Nuclear Fuel Services that Senator Alexander had mentioned, in which a highly-enriched uranium material leaked in a glove box. While the Commission summarized the incident in its May 2007 report to Congress on abnormal occurrences in 2006. We recognize that there were numerous opportunities in which the NRC could have and should have promptly informed Congressional oversight committees.

The NRC takes both incidents very seriously and we are implementing a series of concrete steps to fix the problems. These are discussed in greater detail in my written testimony.

Mr. Chairman and members of the committee, as our agency prepares for the new reactor applications that are expected, we continue to face significant challenges. But we are confident that the plan we have in place will allow us to fulfill our added responsibilities while also remaining focused on the safety and security of the existing fleet of reactors, fuel cycle facilities, and nuclear materials. I want to assure you that we are doing everything we can to continue protecting the American people and the environment.

Mr. Chairman, this concludes my opening statement, and I ask that my written testimony be entered into the record. We look forward to your questions.

[The prepared statement of Mr. Klein follows:]

STATEMENT OF DALE E. KLEIN, CHAIRMAN, U.S. NUCLEAR REGULATORY COMMISSION

Mr. Chairman and Members of the Committee, it is a pleasure to appear before you today along with my colleagues, Commissioners Jaczko and Lyons. On behalf of the Commission, I thank you for your continued support of the NRC's work to protect public health and safety and the common defense and security.

I would like to take this opportunity to focus on a few specific developments that have occurred since the Commission last appeared before you in April. Before I turn to these agency activities, however, I want to highlight one particular event that affected all of us very deeply. This is the first hearing at which the Commission has appeared without our long time colleague and friend Ed McGaffigan. His passing has left a void in the agency and at this table this morning. I want to thank all of you for your kind words of comfort to Ed's family.

GAO REPORT ON NEW LICENSE APPLICATIONS

In August, the Government Accounting Office released a draft report, "Nuclear Energy: NRC's Workforce and Processes for New Reactor Licensing are Generally in Place, but Uncertainties Remain as Industry Begins to Submit Applications" (GAO-07-1129). The report discusses the NRC's ability to manage its workload in

light of the anticipated receipt of 20 new reactor license applications in the next 18 months. The Commission appreciates the time and effort taken by GAO to address this important topic, and we consider the draft report to be comprehensive, fair, and balanced. The report accurately identifies the accomplishments as well as the challenges that the agency faces in preparing its workforce for new reactor licensing reviews.

As the Members of the Committee are aware, the NRC, with the support of Congress, has been addressing this issue as a high priority for several years. The agency is continuing to take aggressive steps to prepare for the challenges outlined in the report. Our Office of New Reactors (NRO), in particular, is hiring staff with the appropriate skill sets and is providing essential training to staff members. In addition, NRO is taking steps to ensure that combined license application reviews are consistent, coordinated, and efficient.

Last week, the NRC received the first of five applications (for a total of 9 new reactors) we believe will arrive this calendar year. As you know, the NRC has licensed over 104 nuclear powerplants in the U.S., and I want to assure you that although the NRC has not licensed any new plants recently, the agency is prepared to address this important activity. The Commission believes that as a result of our efforts in recruitment, training, retention, and knowledge management, the NRC has the skilled work force to complete thorough reviews in a timely and effective manner.

#### REACTOR OVERSIGHT PROCESS VS. INDEPENDENT SAFETY ASSESSMENT

Another issue that I would like to discuss with you this morning is NRC's inspection program for currently licensed reactors. At the April hearing and in subsequent interactions, Members of the Committee expressed a desire for more information comparing the Independent Safety Assessment inspection conducted at Maine Yankee in the mid-1990s and the current, risk-informed, performance-based Reactor Oversight Process.

The NRC conducted an Independent Safety Assessment at Maine Yankee in 1996. It is important to note that the Maine Yankee Independent Safety Assessment occurred prior to the development of the Reactor Oversight Process and in response to a unique set of concerns connected with the facility's power uprate application and allegations of misconduct.

While the Independent Safety Assessment was the proper tool to use in 1996, the Commission believes that today's Reactor Oversight Process is far superior to the Independent Safety Assessment process. In developing the Reactor Oversight Process, the NRC took the lessons learned from the Maine Yankee Independent Safety Assessment and incorporated its best features into the new Reactor Oversight Process, which is designed to be objective and predictable, meaning that given comparable performance, different licensees will receive the same level of regulatory oversight. Unlike the Maine Yankee Independent Safety Assessment, which occurred after performance deficiencies were detected, the Reactor Oversight Process directly couples performance deficiencies at any plant with increased inspection, focuses increased inspection resources to address declining plant performance, and provides insight into the overall root and contributing causes of performance deficiencies. The inspections gather additional information to be used in deciding whether continued operation of the facility is acceptable and whether additional regulatory actions are necessary to address declining plant performance. The Reactor Oversight Process inspection modules utilize on-site inspectors as well as personnel from the regional offices, NRC headquarters, and outside experts to provide a diversity of technical expertise which enhances the degree of independence of the inspection effort. The regulatory tools available to the inspectors, regional and headquarters management, and to the Executive Director for Operations are extensive.

When a plant experiences an isolated operational event or a degraded plant condition that merits immediate enhanced oversight, a prompt, reactive inspection will take place. Similar to the Maine Yankee Independent Safety Assessment, the highest level of reactive inspection requires that the inspection team include members who are independent from significant involvement in the licensing and inspection of the facility.

Although the Commission is confident that the Reactor Oversight Process is superior to the Maine Yankee Independent Safety Assessment, we continue to improve the process. For example, in 2006, the NRC staff, at the direction of the Commission, significantly enhanced the way the NRC reviews design issues. The resulting Component Design Basis Inspection procedure, which is an important element of the Reactor Oversight Process, is a comprehensive team inspection to verify that design bases have been correctly implemented for selected risk significant components and

that operating procedures and operator actions are consistent with design and licensing bases. This inspection procedure ensures that selected components are capable of performing their intended safety functions. The NRC's enhanced Component Design Basis Inspection has been performed at Indian Point Unit 2 and resulted in only minor findings. An equivalent inspection is scheduled to be performed at Indian Point Unit 3 this month.

Recently, NRC staff performed a comparison of the Maine Yankee Independent Safety Assessment and the current Reactor Oversight Process to determine if there are any gaps in the Reactor Oversight Process. After review of the results of the staff's efforts, the Commission remains convinced that the Reactor Oversight Process effectively incorporates the elements of the Maine Yankee Independent Safety Assessment and provides better oversight than an Independent Safety Assessment, since the Independent Safety Assessment was a one-time, "snapshot" inspection and the Reactor Oversight Process provides continual evaluation.

While circumstances that led to the Maine Yankee Independent Safety Assessment do not exist at Indian Point, performance issues at Indian Point have resulted in an increased level of oversight. NRC believes that the current increased level of oversight at Indian Point is appropriate and that the performance of the current Reactor Oversight Process inspection regimen for Indian Point will effectively assess the same elements of plant operation that would have been addressed by the Independent Safety Assessment, albeit over a longer period of time.

#### GAO INVESTIGATION OF MATERIALS LICENSING

A third issue is the GAO investigation of Materials Licensing. Earlier this year, GAO created a fake business in order to obtain a valid radioactive materials license from NRC. After NRC approved the license, GAO investigators altered the license so it appeared that this company was authorized to purchase larger quantities of radioactive sealed sources than the maximum listed on the approved license. GAO then sought to purchase, from two U.S. suppliers, gauges containing sealed radioactive material. The gauges GAO sought to purchase were Category 4 sources under the International Atomic Energy Agency's Code of Conduct which contains 5 categories of sources. GAO also attempted to obtain a license from the State of Maryland, an Agreement State, but withdrew the application after Maryland license reviewers indicated they would visit this company before granting the license.

The NRC has a risk-informed approach to regulating sources, with greater controls imposed on the most significant sources. The Commission recognizes that GAO identified a gap in our program for protecting lower risk sources. As soon as GAO informed us of the problem, we took immediate action to address the weaknesses in our licensing process. Within days, NRC suspended the review of all new applications for materials licenses until it could determine what interim corrective actions were necessary to resolve the weaknesses. NRC discussed the issues with the Agreement States. On June 12, 2007, NRC issued supplemental guidance with additional screening criteria intended to help the NRC license reviewers determine whether a site visit or face-to-face meeting with a new license applicant is required. Such visits are now required by NRC prior to approval of a broader range of applications if the applicant for the new license is not an existing Agreement State or NRC licensee. NRC has also established a pre-licensing working group to develop improved guidance addressing the weaknesses found by GAO.

In addition, the NRC staff has developed an action plan detailing other steps NRC plans to take, and the resources needed, which the Commission approved last month. In approving the plan, the Commission emphasized the importance of developing practical common sense approaches to verify the validity of license applicants.

The action plan consists of three distinct but integrated components. The first component is the previously mentioned Pre-Licensing Working Group, which is being chaired by both a NRC Regional representative and an Agreement State Program Director. The Pre-Licensing Working Group is focusing on relatively short-term fixes that can be implemented quickly while longer term solutions can be considered and implemented as appropriate. The second component is an independent, external review panel consisting of three knowledgeable but independent individuals. This second panel will look at the overall materials security program concerning these lower risk sources and make recommendations, if appropriate, for fundamental program changes. The third component is a Materials Working Group that will be led by NRC Headquarters and have representatives from both the NRC Regions as well as the Agreement States. This third group will review the efforts of the other two components as well as solicit additional thoughts and make recommendations for long term improvements in the regulatory process. Since an over-

whelming majority of these lower risk sources are located in Agreement States, it is vital to have Agreement State participation in this action plan.

#### NUCLEAR FUEL SERVICES

Finally, I want to discuss with you the March 6, 2006 incident at Nuclear Fuel Services in Erwin, Tennessee. During the transfer of a solution containing highly enriched uranium (HEU) through a transfer line, approximately 35 liters of highly enriched uranium solution leaked into a glove box and passed through drains to the floor. Upon discovery, the operator promptly stopped all processing of highly enriched uranium in the facility. The Commission summarized the incident in its May 2007 report to Congress on Abnormal Occurrences in 2006.

The Commission recognizes that there were numerous opportunities prior to the abnormal occurrence report in which the NRC could have and should have promptly informed Congressional Oversight Committees of the highly enriched uranium spill event at NFS. We are instituting actions to ensure that Congress is informed in a timely fashion of future events involving our regulated activities. Regardless of the sensitivity or classification of information, we will promptly inform Congress of significant events and agency actions in response to those events.

We also recognize that the NRC could have shared more information about the event with other agencies and the public. As a result, the Commission directed the staff to work with the Department of Energy's Office of Naval Reactors to revise existing guidelines and procedures to ensure that information on licensed activities involving the Category I fuel facilities is publicly available. The Commission's goal is to strike an appropriate balance between a regulatory process that is open to the public and the protection from disclosure of sensitive information which could be helpful to potential adversaries. The revised guidelines have been approved by the Commission. In September, we provided public access to hundreds of previously withheld documents related to NFS-Erwin, BWX Technologies, and other fuel cycle facilities.

#### CONCLUSION

Mr. Chairman and Members of the Committee, as our agency prepares for the numerous new reactor applications that are expected, we continue to remain focused on the safety and security of the existing fleet of reactors, fuel cycle facilities, and nuclear materials. I want to assure you that we are doing everything we can to continue protecting the American people and the environment.

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#### RESPONSES BY DALE E. KLEIN TO ADDITIONAL QUESTIONS FROM SENATOR BOXER

*Question 1.* In your written testimony you note that the Reactor Oversight Process requires use of independent inspectors, similar to those used during the Maine Yankee Independent Safety Assessment, who have not had significant involvement at the facility when a reactive inspection takes place due to degraded plant conditions or an operational event. If independence is important during reactive inspections, it should also be important during baseline inspections conducted by Nuclear Regulatory Commission (NRC) inspectors throughout the year. Can you explain how NRC's on-site inspectors maintain their independence?

Response. The concept of independence is institutionalized in NRC's routine procedures and practices. NRC code of conduct standards provide that employees must take appropriate steps to avoid even an appearance of a 'loss of impartiality' in the performance of their official duties. Inspectors are not allowed to own securities, such as company stock, that could cause a conflict of interest during an inspection. NRC employees who have previously worked for a licensee (including the parent companies) are not assigned to inspect those facilities for at least a 1-year period and this time frame may be extended if warranted.

In addition to inspections conducted by inspectors located at the regional office, at least two resident inspectors are assigned full-time to each site. To maintain independence, the maximum time a resident inspector can be assigned to a site is 7 years, unless a longer period is specifically approved by the Executive Director for Operations.

Both headquarters and regional office management visit the sites on a routine basis to assess the adequacy of the inspection effort and the independence of the resident inspectors.

Overall, we believe the necessary level of inspector independence is maintained by the processes and procedures described above.

*Question 2.* There has been a lot of attention placed on getting the NRC ready to handle new reactor licenses. As the NRC works to streamline the license application process, how will you ensure that the NRC isn't pressured into cutting corners to speed the review process?

Response. Safety, security, and environmental protection are the paramount concerns of the NRC's review process. The NRC's first priority, regardless of schedules, will be to ensure safety, and therefore, the NRC will not cut corners to speed the review process.

The NRC expects high quality license applications. The timeliness of an application review can be increased without compromising safety and security provided that industry submits complete high quality applications. Specific review schedules for individual applications will be determined when applications are docketed, and will consider factors such as degree of standardization, technical acceptability, and completeness of the application. With the unprecedented increase in our workload, including approximately 19 combined construction and operating license applications, the NRC will need to hire qualified staff and develop strategies for contract support in key technical areas to ensure that resources are available when needed to adequately perform the expected licensing reviews. In addition, the NRC staff has developed a review process titled, "design-centered review approach," to review the expected combined license applications. A standardized, uniform, design-centered approach to both COL application development and NRC review is expected to significantly enhance effectiveness. The NRC staff has updated the regulatory infrastructure necessary to review and approve new reactor applications for light water reactor designs (including contents of a COL application) and has promulgated revisions to 10 CFR Part 52, along with conforming changes to other NRC regulations. In addition, since the review process involves multiple layers of reviewers, which include the key technical leads, project managers, and management, this system of checks and balances will be maintained to address technical or regulatory concerns within the framework of the license application process. Most importantly, the Commission has made it very clear to the staff that safety is the utmost concern going forward. These activities will enhance the NRC's regulatory effectiveness and efficiency in implementing its new reactor licensing and approval processes, and allow applicants to provide focused and complete applications that will minimize the need for supplemental information, and still serve standardized reviews of high quality.

*Question 3.* In April of 2007, the NRC approved a rule that changed the definition of "construction" to allow some construction activities at nuclear plants to commence prior to the issuance of a construction permit or combined operating license (COL) application. The NRC's actions could limit public input and will allow construction activities to begin which could prejudice NRC's decision on a subsequent construction permit or COL application. Please provide an explanation for changing the definition of "construction" in NRC regulations, as well as the time frame by which you expect this change to go into effect. In addition, please provide the legal analysis of the NRC that determined that this action is consistent with current statutory and case law.

Response. Prior to approving a final rule, the NRC follows a process required by the Administrative Procedure Act (APA) (5 U.S.C. 553) and issues a proposed rule in the Federal Register to disclose its contemplated rule language and provide the public with an opportunity to comment on the proposed rule language. The NRC's proposed rule on Limited Work Authorizations (LWA) for nuclear powerplants was published for comment in the Federal Register on October 17, 2006. Thirteen comments on the proposed rule from various stakeholders, including those that represented public interest groups as well as industry, were received and were considered in the development of the final rule.

The final rule was published in the Federal Register on October 9, 2007 (72 FR 57415) and became effective on November 8, 2007. The NRC's legal analysis that determined that this action is consistent with current statutory and case law is set forth in the statements of consideration for the final LWA rule, 72 FR 57425-57430. As discussed in the final rule, the NRC determined that the former definition of construction exceeded the agency's authority, inasmuch as those activities formerly defined as construction—which are now excluded from construction under the final LWA rule—do not have a reasonable nexus to radiological health and safety or common defense and security for which NRC regulatory oversight is necessary and/or the most effective approach for ensuring reasonable protection to public health and safety and common defense and security. See 72 FR 57426.

The NRC does not agree that the changes to the LWA rule could limit public input. The NRC's regulatory regime already included the LWA process, and the rule does not modify or change the public's ability to participate in the licensing process.

The NRC believes that the LWA rule may have the effect of enhancing the ability of external stakeholders to participate in a hearing to resolve their issues with respect to a particular nuclear powerplant. Because of resource limitations, many public stakeholders have expressed their concern that the broad range of issues, addressed by the NRC, at each stage of licensing make it difficult for stakeholders to seek resolution in an NRC hearing for the full range of issues that they are interested in. For these stakeholders, the LWA process—by separating out a defined set of issues to be resolved in advance of the underlying combined license or construction permit proceeding—allows public stakeholders to focus their resources on the relevant issues in a LWA hearing. The process provides an orderly sequencing of the overall set of issues that must be resolved, without introducing unlawful segmentation. The NRC believes that if one considers the revised process in this light, the conclusion is that the LWA process enhances, rather than detracts from, participation in the licensing process by interested members of the public who are resource limited.

The NRC also does not agree that allowing certain activities formerly identified as construction to begin prior to NRC involvement could prejudice NRC's decision on a subsequent construction permit or COL application. The final LWA Rule includes conforming provisions in the NRC's regulations governing the agency's compliance with NEPA, that are intended to ensure that the environmental impacts of pre-construction activities are considered as "cumulative impacts," in the NRC's determination of environmental impacts attributed to the issuance of a construction permit or COL application. Thus, regardless of the "baseline" for determining the environmental impacts of the activities approved by the NRC, the full scope of environmental impacts associated with the nuclear powerplant will be disclosed as part of the NRC's NEPA process.

Response by Gregory B. Jaczko. As I have previously indicated, I do not believe this rule is necessary or supportive of the NRC's mission. My prior votes have expressed my concern with some of the changes to the National Environmental Policy Act (NEPA) process envisioned in this final Limited Work Authorization (LWA) rule. One of the most problematic, and the one I believe places this agency in the most jeopardy, is the issue of what the appropriate baseline is for the environmental reviews necessary once the increased activities allowed pursuant to these changes occur at a potential site. I believe this final rule regarding LWAs also increases the burdens placed upon the Atomic Safety and Licensing Board Panel (ASLBP) at a time when the agency does not have sufficient experience to determine the impacts on the ASLBP of the current anticipated wave of new reactor applications. I am concerned with the potential loss of public confidence in our environmental review process if we proceed in this manner.

*Question 4.* Your written testimony mentions a recent GAO investigation of NRC materials licensing through which GAO investigators were able to obtain and alter a radioactive materials license. The NRC does not require an on-site inspection of the license applicant prior to issuing a license for a Category 3 radioactive sealed source. Some states, such as Maryland, have determined that pre-licensing inspections are necessary. Do you think that the NRC and agreement states should have the same requirements? In addition, do you expect the NRC to change its requirement for pre-license inspections as a result of this investigation? If not, why not?

Response. In response to the GAO's findings, the NRC immediately began conducting on-site inspections or in-office meetings for all new radioactive materials license applicants. Exceptions may be made for applicants who already possess, or are listed on, a valid NRC or Agreement State license. The NRC and the Agreement States are working together to revise the pre-licensing guidance, which prescribes when a pre-licensing inspection should be performed. Agreement States pre-inspection requirements will have to be at least as stringent as those contained in the revised pre-licensing guidance. Implementation of the pre-licensing guidance will be verified through the NRC's Integrated Materials Performance Evaluation Program, which is used to evaluate NRC and Agreement State radioactive materials programs.

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RESPONSES BY DALE E. KLEIN TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

*Question 1.* Those who argue that there is a need for an Independent Safety Assessment suggest that the NRC is not independent enough. Please summarize the procedures and processes that the NRC has in place to ensure it remains independent and objective.

Response. The Energy Reorganization Act (ERA) of 1974 established the NRC as an independent regulatory agency without responsibilities for promoting nuclear development. The NRC's status as an independent regulatory agency means that its regulatory decisions ordinarily cannot be dictated by the President or by other Executive Branch Agencies. No more than three of the five Commissioners may be members of the same political party. Commissioners may be removed from office only for inefficiency, neglect of duty, or malfeasance in office.

As part of the Reactor Oversight Process (ROP), the NRC performs inspections of operating reactors. The NRC is committed to independent, thorough, and objective inspections at all NRC-regulated facilities. NRC inspectors undergo a comprehensive qualification and training program and have the primary responsibility for ensuring that licensees operate plants safely and in accordance with their license and NRC regulations and that their inspection findings are accurately reported, and referenced material is correctly characterized.

The concept of independence is institutionalized in NRC routine procedures and practices, with standards and procedures set forth in its Inspection Manual. For example, Chapter 0102 of the Inspection Manual, "Oversight and Objectivity of Inspectors and Examiners at Reactor Facilities," provides requirements and guidance for ensuring objectivity and that inspectors implement the NRC's programs in an unbiased manner, free from partiality and antagonism toward a licensee or vendor. These requirements are used by NRC managers as a guide for employee conduct and as part of inspector performance reviews. Both headquarters and regional offices visit the sites on a routine basis to assess the adequacy and objectivity of the inspection effort. Inspection Manual Chapter 1201, "Conduct of Employees," provides standards to prevent the loss of impartiality. This chapter provides a standard of conduct that must be followed by NRC employees and contains NRC policy based on government-wide rules, such as prohibiting the acceptance of gifts from licensees and business relationships with employees of the licensee and requiring inspectors to report to their supervisors close friendships with licensee employees. It also incorporates general governmental ethics rules, which serve to promote the NRC's objectivity and independence. NRC regulations preclude inspectors and other employees from owning securities issued by utilities and other major entities regulated by the NRC. Criminal conflict of interest laws prohibit NRC employees from participating personally and substantially in any matter that could directly and predictably affect the employee's financial interest or of family members or an organization with which the employee is negotiating for prospective employment.

NRC employees who have previously worked for a licensee (including their parent companies) are not assigned to inspect those facilities for at least a 1-year period, and this time frame is generally extended beyond 1 year. To maintain independence, the maximum time a resident inspector can normally be assigned to a site is 7 years. As part of the ROP, inspections conducted as a result of an incident or poor performance require that the inspection team include members without significant involvement in the licensing and inspection of the facility. Finally, inspectors from headquarters or the regions are at times assigned to inspect plants in other regions.

The NRC also strives to promote openness in its inspection process. State nuclear officials are typically allowed to accompany NRC inspectors and observe inspection activities. These State officials have the opportunity to air any concerns with the NRC inspectors. Following inspections, the NRC holds exit meetings with the licensees to discuss the inspection findings. These meetings are generally open to the State officials.

Plant employees and members of the public also have an opportunity to bring safety concerns directly to the NRC's allegations program. They may also petition the NRC to take enforcement action against a licensee under 10 C.F.R. 2.206. If plant employees or members of the public wish to make complaints about the conduct of an NRC inspector or employee, they may also raise the issue with the employee's supervisor or with the NRC Office of the Inspector General.

The NRC Office of the Inspector General (OIG) continually monitors specific issue areas, including the NRC's regulation of nuclear reactors. The OIG performed an independent audit on the ROP (Audit Report OIG-05-A-06, "Audit of NRC's Baseline Inspection Program," dated December 22, 2004). The results of the audit were positive, identifying only minor opportunities for enhancement. More recently, the OIG has performed an audit of the NRC's reactor license renewal process. (Audit Report OIG-07-A-15, "Audit of NRC's License Renewal Program," dated September 6, 2007). The Government Accountability Office also routinely conducts audit and program reviews of NRC activities.

The Advisory Committee on Reactor Safeguards (ACRS) provides additional independent review of safety issues. An ACRS report is required prior to granting a license renewal or power uprate as well as for combined license applications for new

reactors. ACRS meetings are open to the public as required by the Federal Advisory Committee Act.

The NRC is confident that its policies and procedures ensure the independence and integrity of NRC inspection efforts.

*Question 2.* Please describe all opportunities within the Reactor Oversight Process for State officials and other stakeholders to participate.

Response. As a matter of management philosophy, the NRC maintains an “open door” policy with regard to access by the public or State and local officials to the NRC staff, or to publicly available electronic documentation concerning a licensee’s performance.

The NRC staff conducts monthly Reactor Oversight Process (ROP) meetings which are open to the public. The dates and times of these meetings are posted on the NRC Web site and are published in the Federal Register Notice. The NRC also solicits feedback, during a biennial survey, on the ROP from the licensees and other external stakeholders.

The NRC has a long-standing policy of permitting State representatives to observe NRC inspections. This policy sets out the general framework for NRC’s cooperation with States, including keeping the States informed in a timely manner and establishing the process for States to either observe or participate in NRC inspections. In fact, it is not uncommon that some State representatives accompany NRC inspectors during their inspections.

In addition, the NRC conducts an annual public meeting with the licensee to discuss the results of the NRC’s annual assessment of the licensee’s performance. The location of the meeting is held in the vicinity of the licensee’s plant so that local stakeholders can attend. Often, the NRC holds a town hall type meeting with local stakeholders to discuss the ROP process.

Detailed information about the ROP is also available to the public on the NRC Web site. This includes inspection reports, findings summary, and the ROP action matrix for each plant.

*Question 3a.* Does the NRC believe that an Independent Safety Assessment would add value in terms of safety or improving public confidence in the NRC? Why/why not?

Response. No. The NRC believes that the Reactor Oversight Process (ROP) effectively incorporates the elements of the Independent Safety Assessment (ISA) and provides better oversight than an ISA, since the ISA was a one-time, “snapshot” inspection and the ROP provides continual evaluation of each plant. The NRC believes that the ROP adds value in terms of safety and public confidence because the inspections provide an objective, predictable, understandable, and risk-informed approach to support increased NRC oversight, over a longer period of time.

In developing the ROP, the NRC used the lessons learned from the Maine Yankee ISA, and incorporated its best features into the ROP, which is designed to be objective and predictable. Unlike the Maine Yankee ISA, which occurred after performance deficiencies were detected, the ROP directly couples performance deficiencies at any plant with increased inspections, focuses increased inspection resources on declining plant performance, and provides insight into the overall root and contributing causes of performance deficiencies. The ROP inspections gather additional information to be used in deciding whether continued operation of the facility is acceptable, and whether additional regulatory actions are necessary to address declining plant performance.

*Question 3b.* Please provide the NRC’s comparison of the Maine Yankee Independent Safety Assessment with the Reactor Oversight Process.

Response. Recently, the NRC staff performed a comparison of the Maine Yankee (MY) Independent Safety Assessment (ISA) and the current Reactor Oversight Process (ROP) to determine if there were any gaps in the ROP. After review of the results of the staffs efforts, the NRC remains convinced that the ROP effectively incorporates the elements of the MY ISA and provides better oversight than the ISA, since the ISA was a one-time “snapshot” inspection and the ROP provides continual evaluation.

The ISA was started in July 1996 and completed in October 1996. It focused on conformance of the facility to its design and licensing bases, operational safety performance, licensee self assessments, corrective actions and improvement plans, and determination of the causes of safety-significant findings.

*Description of the ROP.*—The ROP is anchored in the NRC’s mission to ensure public health and safety in the operation of commercial nuclear powerplants. To measure plant performance, the oversight process focuses on seven specific “cornerstones” that support the safety of plant operations: initiating events, mitigating systems, barrier integrity, emergency preparedness, occupational radiation safety, pub-

lic radiation safety, and physical protection. These cornerstones are evaluated using both performance indicators (PIs) and direct inspections. The NRC assessment program collects information from inspections and performance indicators in each cornerstone to enable the NRC to arrive at objective conclusions about the licensee's safety performance. Inspection findings are evaluated for safety significance using a generally objective significance determination process. Performance indicator data is compared against prescribed risk informed thresholds.

Based on this assessment information, the NRC determines the appropriate level of agency response, including supplemental inspections focusing on areas of declining performance and pertinent regulatory actions ranging from management meetings to orders for plant shutdown. The process uses four levels of regulatory response, with NRC regulatory review increasing as plant performance declines. The first two levels of heightened regulatory review are managed by the appropriate NRC regional office. The next two levels call for an agency response and involve senior management attention from both headquarters and regional offices. The scope of inspections are driven by plant performance. A poor performing plant having multiple or long-standing significant issues will be inspected using a procedure that incorporates processes and techniques originally used in the previous Diagnostic Evaluation Team (DET) process that was applied at Maine Yankee. For example, in 2006 there were three plants receiving increased regulatory attention. In each case, the plant warranted this major increase in NRC oversight because plant performance had met specific pre-defined criteria.

Even if there are no earlier signs of declining plant performance, if a plant experiences operational problems or events that the NRC believes require greater scrutiny, there will be additional reactive inspections. The criteria for initiating these reactive inspections are described in the publicly available NRC Management Directive (MD) 8.3, "NRC Incident Investigation Program," and are typically used about a dozen times per year. In some instances the regulatory actions dictated by the ROP framework may not be appropriate. In these instances, the NRC may deviate from the prescribed inspection program to allow modified regulatory oversight for a facility based on specific circumstances. Historically there have been 1–3 deviations each year. Use of the deviation process requires senior NRC management approval.

It should be noted that the Reactor Oversight Process (ROP), is implemented through the use of voluntary initiatives by industry in the regulatory process. The ROP uses a Significance Determination Process (SDP) to determine the safety significance of most inspection findings identified at commercial nuclear powerplants. If violations that are more than minor are associated with these inspection findings, they will be documented and may or may not be cited depending on the safety significance. These violations are not normally subject to civil penalties. Violations associated with inspection findings that are not evaluated through the SDP are subject to enforcement and civil penalties.

Violations associated with findings that the SDP evaluates as having very low safety significance (i.e., green) are normally issued as Non-Cite Violations (NCV). While licensees must correct these minor violations, they do not normally warrant documentation in inspection reports and do not warrant enforcement action.

Violations associated with findings that the SDP evaluates as having low to moderate safety significance (i.e., white), substantial safety significance (yellow), or high safety significance (red) are cited in a Notice of Violation (NOV) requiring a written response. These types of violations may result in enforcement action and the issuing of a civil penalty. The Commission reserves the use of discretion for particularly significant violations to assess civil penalties in accordance with Section 234 of the Atomic Energy Act of 1954.

Overall, the current ROP inspection procedures and NRC review standards provide essentially full coverage of all key aspects of the Maine Yankee ISA, with greater attention to safety culture and better focus on potentially risk-significant problems.

*Question 4.* Several issues have been raised with the Reactor Oversight Process' Significance Determination Process: the timeliness, the extent to which inordinate resources are focused on *de minimus* risk evaluations, and the degree to which significance determinations accurately reflect safety significance of inspection findings. Since these issues affect the NRC's oversight of a licensee and the public's perception of that licensee, please describe the NRC's actions to resolve these issues.

Response. The NRC has taken specific steps to improve the significance determination process (SDP). These steps include identifying internal best practices to improve SDP timeliness, monitoring and holding the Office Directors accountable to meeting the metrics, and training NRC staff and improving the evaluation tools

available. The SDP timeliness goal has improved dramatically; however, it is important to note that a large amount of the time it takes to determine the significance of an event is the result of technical discussions between NRC staff and the licensee. In addition, since its implementation in April 2000, the SDP has undergone several significant enhancements based on feedback from internal and external stakeholders and the recommendations of two independent audits.

*Question 5.* Over 99 percent of the Reactor Oversight Process Performance Indicators are green. Do the performance indicators serve the purpose of identifying declining plant performance?

Response. The NRC staff is confident that the Reactor Oversight Process (ROP) identifies early issues of declining plant performance, but recognizes the need to continually improve the PI program to better identify outliers and to provide more meaningful indications of declining plant performance. The NRC staff and industry have made a number of changes to the PI program in recent years as discussed below, which improve the ability to identify problems in plant performance.

The NRC staff and many stakeholders remain concerned that the current set of performance indicators (PIs) and thresholds could do more to identify outliers and detect declining plant performance. As a result of internal and external survey responses, the following two PI self assessment metrics were not met in CY 2006: whether the PI program provides useful insights to help ensure plant safety, and whether the PI program identifies performance outliers in an objective and predictable manner.

The Mitigating Systems Performance Index is a risk-informed PI that monitors important safety systems. It replaced the Safety System Unavailability PIs in April 2006. The NRC staff continues to monitor its implementation and to address implementation issues through the monthly ROP public meetings and through the ROP PI frequently asked question process. In the 1½ years of its existence, this PI has identified performance issues at 21 plants.

The NRC staff also implemented the Unplanned Scrams with Complications PI in the third quarter of CY 2007. It replaced the Unplanned Scrams with Loss of Normal Heat Removal PI, a controversial PI that caused a large number of issues for the staff and industry. Although the NRC staff has received only one report on this PI from licensees, it too shows promise of being more effective than the PI it replaced.

The NRC staff plans to continue to improve the ROP and search for more effective PIs to replace existing indicators where necessary.

*Question 6a.* Please provide a thorough explanation of the bases for the NRC's current efforts on Safety Conscious Work Environment; it's interactions with licensees and stakeholders and the current process for evaluation [of] work environments.

Response. The NRC's expectations for licensee's establishing and maintaining a Safety Conscious Work Environment (SCWE) are outlined in a May 14, 1996, policy statement entitled, "Freedom of Employees in the Nuclear Industry to Raise Safety Concerns Without Fear of Retaliation." A SCWE is defined as an environment in which employees are encouraged to raise safety concerns, both to their management and to the NRC, without fear of retaliation and where such concerns are promptly reviewed, given the proper priority based on their potential safety significance, and appropriately resolved with timely feedback by licensee management to employees. SCWE is an important attribute of safety culture. In general, management commitment to safety will promote a SCWE. Possible indications of an "unhealthy" safety culture include a high number of allegations, or a reticence of licensee employees to use internal processes to raise safety concerns.

All NRC licensees and contractors are expected, although not required by regulation, to establish and maintain a SCWE. Such a work environment contributes to safe operation of NRC-regulated facilities. The NRC issued a Regulatory Issue Summary (RIS), 2005-18, "Guidance for Establishing and Maintaining a Safety Conscious Work Environment" on August 25, 2005, to provide supplementary guidance on fulfilling this expectation, originally communicated in the NRC 1996 policy statement. The RIS provided guidance on (1) encouraging employees to raise safety concerns, including recognition initiatives and communication tools, (2) SCWE training content, (3) Employee Concerns Program and ombudsman programs, (4) tools to assess the SCWE, including performance indicators, behavioral observations, and surveys, (5) contractor awareness of SCWE principles and expectations, and (6) processes to help detect and prevent discrimination and avoid the appearance of discrimination.

The NRC staff has sought input from external stakeholders during the development of the safety culture initiative. Examples of these interactions include frequent public meetings, briefings of Congressional staff, presentations at advisory com-

mittee meetings, monthly ROP public meetings with industry representatives and other interested members of the public, and industry employee concern program forums.

With regards to the current process for evaluating the SCWE at nuclear powerplants, within the ROP baseline inspection procedure (IP) 71152, "Identification and Resolution of Problems", a number of SCWE related interview questions are provided for the inspector(s) to use to gather insights regarding whether there are impediments to address the NRC's expectations for establishing and maintaining a SCWE at the site. The questions address: employee willingness to raise concerns, management behaviors to encourage raising concerns, the effectiveness of the Corrective Action Program and Employee Concerns Program, and the effectiveness of management in detecting and preventing retaliation and a chilled SCWE. This inspection procedure is typically implemented on a biennial basis at each site.

In addition, allegation trends in general are also reviewed on a periodic basis to assess a licensee's SCWE. If a specific allegation of an unhealthy, chilled work environment is substantiated, or if the trend analysis indicates a concern in this area, the NRC considers issuing a Chilling Effect Letter to the licensee. The purpose of the Chilling Effect Letter is to publicly notify the licensee of the NRC's concern that the SCWE is not healthy and to request information on what corrective actions will be taken to address those concerns.

*Question 6b.* Please include any lessons learned and potential future improvements to the program.

Response. A weak safety culture was identified as the root cause of the Davis-Besse nuclear powerplant reactor vessel head degradation. The NRC's Davis-Besse Lessons Learned Task Force recommended that the staff review the Reactor Oversight Process (ROP) inspection and assessment elements to determine their ability to identify and disposition the types of problems that arose at Davis-Besse. In August 2004, the NRC initiated efforts to enhance the ROP which resulted in enhancements to the ROP consistent with the regulatory principles that guided the development of the ROP.

*Question 7a.* Please provide a thorough explanation of the bases for the NRC's safety culture initiative, the characteristics of an ideal safety culture, and how the initiative has been integrated into the Reactor Oversight Process.

Response. A weak safety culture was identified as the root cause of the Davis-Besse nuclear powerplant reactor vessel head degradation. The NRC's Davis-Besse Lessons Learned Task Force recommended that the staff review the Reactor Oversight Process (ROP) inspection and assessment elements to determine their ability to identify and disposition the types of problems that arose at Davis-Besse. In August 2004, the NRC initiated efforts to enhance the ROP which resulted in enhancements to the ROP consistent with the regulatory principles that guided the development of the ROP.

The ROP enhancements are intended to: (1) provide better opportunities for the NRC staff to consider safety culture weaknesses and to encourage licensees to take appropriate actions before significant performance degradation occurs at the site, and (2) provide the staff with a process to determine the need to specifically evaluate a licensee's safety culture after performance problems have resulted in the placement of a licensee in the degraded cornerstone column of the action matrix.

Regarding the characteristics of an ideal safety culture, the NRC staff developed a set of safety culture components (that collectively describe the characteristics of a safety culture for a nuclear powerplant licensee) based on its research of industry, international documents, and the collective experience of the staff. The NRC staff ensured that the safety culture component descriptions fell within the NRC's regulatory purview and were applicable to power reactor licensees. The safety culture components were compared to both industry (including safety culture attributes developed by the Institute of Nuclear Power Operations) and international safety culture attributes to ensure that appropriate concepts were captured. The safety culture components include: decisionmaking; resources; work control; work practices; corrective action program; operating experience; self- and independent assessments; environment for raising concerns; preventing, detecting, and mitigating perceptions of retaliation; accountability; continuous learning environment; organizational change management; and safety policies. These are elaborated on in Inspection Manual Chapter (IMC) 0305, "Operating Reactor Assessment Program." As experience is gained with the implementation of the enhanced ROP, the NRC staff will re-evaluate the adequacy of its safety culture components.

The ROP safety culture enhancements for the baseline inspection program became effective on July 1, 2006. The revised ROP guidance has been in place for an initial implementation period of 18 months (through the end of calendar year 2007). The

final supplemental IP (95003) that was enhanced as part of the safety culture initiative was issued on October 26, 2006. A self assessment of ROP safety culture effectiveness is being performed in FY 2008, and any identified enhancements will be incorporated.

*Question 7b.* Please include any lessons learned and potential future improvements to the program.

Response. Several activities are underway which will provide valuable insights to the effectiveness of the ROP safety culture enhancement. These include: (1) a NRC staff audit of a sample of inspection reports and inspection findings to evaluate the appropriateness of the assigned (or not assigned) cross-cutting aspects, (2) a review to evaluate implementation practices across the four regions with regard to how inspection findings are identified, how cross-cutting aspects are assigned, and how substantive cross-cutting issues are identified, (3) the generation of a lessons learned input from the first-time implementation of IP95003 at Palo Verde, (4) input from periodic meetings with industry representatives where feedback is provided from the licensees' perspectives on how the Reactor Oversight Process (ROP) safety culture enhancements are being implemented, and (5) input from the CY2007 ROP self-assessment external survey on the safety culture topic.

The NRC staff will continue to compile lessons learned and identify opportunities for further ROP safety culture improvements.

*Question 8.* Under what conditions should a performance indicator and an inspection finding, resulting from the same failure/event both, count against the licensee in the Reactor Oversight Process' Action Matrix?

Response. In most cases, PIs and inspection findings are included in the NRC staff's consideration of the appropriate agency response (column of the ROP Action Matrix) for any particular licensee. In the case that performance indicator information, such as an equipment failure or a scram, is also concurrent with an inspection finding that uses this same information, IMC 0305 requires the NRC staff to assess whether these inputs have the same "underlying causes," and if so, they should not both be used in the ROP assessment process.

*Question 9.* Is the NRC ready to complete thorough reviews of combined license applications in a timely and efficient manner?

Response. Yes. The NRC has recruited and restructured the NRC staff organization to attract and maintain high caliber staff. We have also worked on infrastructure (i.e. review guidance) for staff reviewers. As a result of our planning, the NRC is on time, and on target, for the first two reviews of combined license applications. There are, however, several regulatory initiatives the NRC must complete. Specifically, the NRC must complete a security rule, and an aircraft impact rule. These rulemakings are scheduled to be completed by the end of next year. Ensuring that the appropriate amount of resources (i.e., budget) are provided to the NRC will continue to sustain our efforts.

*Question 10.* By the end of 2008, the NRC is expected to receive applications for 22 new reactors. I am concerned that the demand on NRC resources will be significant, but the agency doesn't yet have a process for prioritizing resources among competing licenses. How do you plan to manage that situation?

Response. The Agency has been focused on these issues for several years. On November, 16, 2006, the Commission provided staff with a set of factors to consider when making resource allocations and schedule decisions if and when licensing work exceeds budgeted funds for new reactors. The criteria were designed to encourage applicants for new nuclear powerplants to develop high quality comprehensive applications; complete as much coordination with other Federal, State, and local agencies as possible; and demonstrate a commitment to build a plant in the near term. By giving priority to such applications, the NRC will maximize the value and efficiency of its license review activities. Having these factors on the record and publicly documented for over a year provides the Agency with a transparent foundation for making resource allocation decisions if the Agency's appropriations requests are reduced in the upcoming fiscal years.

*Question 11a.* In the expanded technical sufficiency and completeness of new plant license applications, what is the standard for technical sufficiency?

Response. While a determination on the "completeness" of the application is based on the scope of the application addressing the regulations, "technical sufficiency" as used during the acceptance review is based on the depth of information consistent with the implementing guidance documents (e.g., Regulatory Guide 1.206 and the Standard Review Plan). The standard for "technical sufficiency" is primarily such that the NRC staff can not only begin its detailed technical review but complete it within a predictable timeframe. Even though an application is technically sufficient,

that does not preclude requests for additional information. As an example, an insufficient section of an application would be the introduction of a new safety feature without supporting analysis. In this case, the technical staff might be able to initiate the detailed technical review on the functionality of the safety feature, but could not provide a predictable schedule for obtaining a reasonable assurance finding on the new safety feature until after receipt of the supporting analysis.

*Question 11b.* How will the NRC ensure that the technical sufficiency review doesn't become a de facto RAI process?

Response. During the "technical sufficiency" review, the NRC staff will compare the application against the expected content in Regulatory Guide 1.206 and the acceptance criteria in the standard review plan. It should be noted that technical sufficiency review, as described in the acceptance review process, will involve the identification of areas where it is not readily apparent that the engineering has been completed for a particular area, rather than a request for additional information, which is to serve to clarify engineering assumptions, calculations, and methodologies. This will result in a compilation of issues. Through internal discussions, the NRC staff will determine which of these will become "acceptance review" issues and which will likely result in requests for additional information during the detailed technical review. The standard for technical sufficiency, as discussed in Question 11a., really depends on the NRC staff's determination whether the identified issue could be addressed within a predictable timeframe such that the staff could begin its detailed review and complete its review within the developed schedule.

*Question 11c.* The Combined License Review Task Force concluded that the expanded technical sufficiency and completeness review should result in a net schedule savings of approximately 2–4 months. What assumptions form the basis for this conclusion?

Response. The assumptions that form the basis of a net future schedule savings of approximately 2–4 months in conducting an expanded acceptance review include: improving the basis for accepting the application or deferring the start of the review, providing the potential for early interactions with the applicant to discuss the review results and make timely requests for supplemental technical information, reducing the need for requests for additional information based on submissions of high quality applications, developing an application-specific review plan and schedule, and having early interactions with the NRC's Advisory Committee on Reactor Safeguards to discuss the application-specific review plan and the key technical areas the NRC staff intends to focus on during the review (e.g., new technologies, new analysis methods, unique site-specific conditions, need for staff confirmatory analyses, etc.)

*Question 12a.* Chairman Klein's testimony indicated that "the NRC has the skilled workforce to complete thorough reviews in a timely and efficient manner." Yet, the first application was filed on September 24 but the technical sufficiency and completeness review did not officially begin until October 1.

Was the staff unprepared to begin its review of the first and only application received to date?

Response. The NRC staff was prepared for the review. In order to facilitate the actual review, however, it takes several days to establish the schedule and logistics for the review, after the receipt of the application. For example, the application must be loaded electronically into our Agencywide Documents Access and Management System (ADAMS) and made available to the NRC staff and the public. In this instance, the NRC staff needed to work with the applicant to correct aspects of the application that did not satisfy federal requirements for electronic records and found ways to minimize the impact of this activity on the overall schedule.

*Question 12b.* Chairman Klein's testimony indicated that "the NRC has the skilled workforce to complete thorough reviews in a timely and efficient manner." Yet, the first application was filed on September 24 but the technical sufficiency and completeness review did not officially begin until October 1.

Does the staff anticipate being unable to complete the technical sufficiency review within 60 days, thereby requiring an extra week?

Response. As noted in the answer to Question 12a., the time between September 24 and October 1, 2007, was for the logistics of making the application available to NRC staff. The acceptance review for this application was completed on November 29, 2007.

*Question 12c.* Chairman Klein's testimony indicated that "the NRC has the skilled workforce to complete thorough reviews in a timely and efficient manner." Yet, the first application was filed on September 24 but the technical sufficiency and completeness review did not officially begin until October 1.

What steps is the Commission taking to ensure that staff is ready to receive future applications and perform the technical sufficiency review within 60 days?

Response. The NRC staff has been trained and been provided guidance on the acceptance review process and the 60 day acceptance review goal. The NRC has taken other key steps to ensure that that staff are ready. For example, the NRC has moved and/or hired a significant number of staff and placed them in the optimum organization to accomplish this workload. We have planned and provided all of the guidance necessary to accomplish the reviews. We have even pre-planned the schedules for anticipated applications over the next few years. The Commission has encouraged the staff to not accept applications that are insufficient. The ability to do so is an important tool for ensuring the 60 day review goal is met.

*Question 12d.* Chairman Klein's testimony indicated that "the NRC has the skilled workforce to complete thorough reviews in a timely and efficient manner." Yet, the first application was filed on September 24 but the technical sufficiency and completeness review did not officially begin until October 1.

If the NRC's goal is completion of the technical sufficiency and completeness review in 60 days, why does the Commission plan to measure employee performance against a 75 day goal?

Response. The 75-day goal allows time for NRC staff interaction with the applicant. The extra time allows applicants to potentially supplement their application to make it complete and technically sufficient so that the staff is not compelled to return the application.

*Question 13a.* The NRC is renowned for its ability to generate numerous Requests for Additional information (RAIs) which, without proper management, can be a cumbersome process that leads to unnecessary delays.

How will you ensure disciplined management of this process?

Response. The review processes for design certifications, combined licenses, or other major licensing actions usually involve the need for the NRC staff to seek additional information from applicants to support our finding that the proposed actions pose no undue risk to the public health and safety. The NRC uses various administrative tools to ensure that the review process works efficiently and that requests for additional information do not unreasonably delay the completion of the NRC review. The NRC staff expects that the principal determinant of the number and extent of RAIs will be the quality and completeness of the application. Regarding the preparation of applications, the NRC staff has issued various guidance documents for use by applicants to help ensure that the applications contain the necessary information in a consistent format. The NRC staff has also had and continues to have routine meetings with the industry to discuss issues of content and format of applications. Upon receipt of an application, the NRC staff performs an initial review to ensure the application includes sufficient information to commence its review with confidence that the review can be completed in a predictable manner. To ensure that questions posed during the review have a nexus to the ultimate agency decision regarding an application, the NRC has structured a format for requests for additional information and each question is reviewed and approved by management before a formal request is sent to an applicant.

*Question 13b.* The NRC is renowned for its ability to generate numerous Requests for Additional information (RAIs) which, without proper management, can be a cumbersome process that leads to unnecessary delays.

Without the computer-based tracking system in place, how will you ensure that each issue will only need to be resolved once, without requiring a redundant answer from each subsequent applicant?

Response. The NRC has implemented tracking systems for ongoing design certification reviews and has developed an improved electronic system for creating, approving, and tracking of questions to applicants. The electronic system will be deployed for use during the NRC review of the first combined license applications and will include the ability to identify questions and responses from design certification and combined license reviews.

*Question 14.* According to the GAO, the estimates of staff-time required for each review does not reflect any efficiencies gained through applying the design-centered approach. If the NRC doesn't anticipate gaining efficiencies, then the staff will have no incentive under the internal budget process to achieve those efficiencies. How will your FY09 budget reflect anticipated increases in efficiency?

Response. The NRC's estimated cost to review a combined license (COL) application depends on whether the application is a Reference or Subsequent COL. In the formulation of the FY 2009 budget for new reactors, the NRC assumed that applicants would utilize the Design Centered Review Approach, such that for Subsequent

COL applications, a substantial reduction in the level of review effort will be realized. The estimated direct total cost to review a Reference COL is approximately \$18.2 M (37 FTE and \$7.2 M for contractors) and each Subsequent COL is approximated at \$10.6M (20 FTE and \$4.6M for contractors). The NRC will gain efficiency by having the subsequent applications take advantage of the review of common information from the reference application. Utilizing common information from the reference COL allows for a reduction in the level of resources required in subsequent COL reviews. Construction and vendor inspection resources associated with a COL are not included in the above estimate of resources.

*Question 15a.* In the Dominion/North Anna Early Site Permit proceeding, the Atomic Safety and Licensing Board resolved all issues in favor of Dominion but raised generic policy issues for the Commission's consideration.

What is the rationale for delaying the issuance of the Dominion ESP?

Response. Under the provisions of 10 CFR 2.340, in effect at the time the Dominion ESP application was filed and processed, there was an automatic stay of the effectiveness of a licensing board decision on an early site permit (ESP) until the Commission acts. Thus, the NRC staff was unable to issue the permit until the Commission issued an order authorizing the NRC staff to issue the permit. This automatic stay provision was removed for future applications as of September 27, 2007, as part of the Commission's recent revisions to 10 CFR Part 52. On November 20, 2007, the Commission authorized its Office of New Reactors to issue an ESP to Dominion Nuclear North Anna, LLC for the North Anna ESP site near Louisa, Va. The NRC staff has 10 business days to carry out the Commission's directions and issue the permit, the third ESP the NRC has approved.

*Question 15b.* In the Dominion/North Anna Early Site Permit proceeding, the Atomic Safety and Licensing Board resolved all issues in favor of Dominion but raised generic policy issues for the Commission's consideration. Is that rationale consistent with the Commission's decision against providing guidance on generic issues in individual proceedings, based on the Combined License Review Task Force report?

Response. The Combined License Review Task Force recommended that the Commission consider rulemaking to resolve issues that are generic to combined license applicants, to allow resolution in a public rulemaking process, rather than in individual contested proceedings. The Commission directed the Staff to identify appropriate subjects for generic rulemaking.

*Question 16.* Please identify all anticipated rulemakings, the schedule for completing the rulemakings, and the process by which the resulting decisions will be applied to the potential new license applications without incurring increased litigation or creating delays in the review process.

Response. The NRC has recently issued several major rulemakings dealing with the licensing of new nuclear powerplants. These include major changes to Part 52 of Title 10 of the Code of Federal Regulations (and related changes to Parts 1, 2, 10, 19, 20, 21, 25, 26, 50, 51, 54, 55, 72, 73, 75, 95, 140, 170 and 171) to clarify and improve our regulatory processes, changes to enhance the efficiency of the process for limited work authorizations, and codification of a revised design basis threat. A complete description of ongoing and planned NRC rulemaking activities is included in NUREG-0936, "NRC Regulatory Agenda," which is issued semi-annually. Ongoing rulemakings that will apply to applications for design certifications and combined licenses for new nuclear powerplants include:

A proposed rulemaking to require designers of new nuclear powerplants to assess the impact of a large commercial aircraft and evaluate design features that could provide additional inherent protection to avoid or mitigate, to the extent practicable, the effects of the aircraft impact, with reduced reliance on operator actions. The proposed rule was issued for public comment in October 2007. The final rulemaking is expected in mid-2008.

A proposed rulemaking to revise security requirements for operating and future nuclear powerplants to codify requirements included in Orders issued following the events of September 11, 2001; fulfill certain provisions of the Energy Policy Act of 2005; and address other insights and issues related to security at nuclear facilities. The proposed rule was issued for public comment in October 2006. Due to the large number of public comments received and the need to prepare related regulatory guidance documents, the final rulemaking is expected in late 2008.

A proposed rulemaking to revise requirements for fitness for duty programs for operating and new nuclear power reactors, including activities during construction. The proposed rule was issued in August 2005. The final rulemaking is expected in early 2008.

The NRC has evaluated the potential implications of these rulemakings on the licensing or design certification processes and discussed issues with applicants and potential applicants. The NRC will ensure that applicants have the necessary information to prepare for implementation of these new rules during the NRC's review of their applications. The NRC does not believe that these or other rulemaking activities will introduce delays or significant risks of additional litigation to the review process. These activities may reduce litigation in the long term by improving clarity in areas of evolving regulatory and public interest.

Senator CARPER. It will be. Thank you.

Commissioner Lyons, my guess is that your name is not often mispronounced. Commissioner Jaczko, my guess is your name is mispronounced about once an hour.

[Laughter.]

Senator CARPER. I will just say to my colleagues, the way I learned how to pronounce Commissioner Jaczko's name is that I think of a yacht, that he lives on, sails on, probably every day. Not really.

[Laughter.]

Senator CARPER. But I think of a yacht, and then I add "sko" to the end of that, and usually I am able to get it right. Commissioner Jaczko, you are recognized for 3 minutes, and you will be succeeded by Commissioner Lyons.

**STATEMENT OF HON. GREGORY B. JACZKO, COMMISSIONER,  
NUCLEAR REGULATORY COMMISSION**

Mr. JACZKO. Thank you, Mr. Chairman. I would note that my name is rarely mispronounced at this Committee, and I appreciate that.

I appreciate the opportunity to testify today with my fellow commissioners and the chairman to talk about operating reactor safety. As many of you have mentioned, we are on the verge of an era of new reactor licensing. While we are in that era, the most important issue continues to be the focus on the 104 operating nuclear powerplants that we have today and ensuring their safety.

We have a very extensive program to do that, involving a large number of inspectors, including resident inspectors at every plant that we have. But the agency relies tremendously on licensees to identify and report issues. One of the things that continues to trouble me is situations in which licensees do not report issues to the Commission. The incident with Peach Bottom was raised. That was a situation in which an individual did not feel comfortable bringing that to the management at the facility, nor to bringing the evidence to the NRC. Those continue to be issues that trouble me.

We still continue to deal with complicated safety issues, such as the potential for the emergency core cooling systems to fail during certain accident scenarios. That is a longstanding issue that this Commission has been working on to address, and I think we are finally close to resolving that. We still have areas, such as fire protection, where we have challenges to implementing an effective and efficient regulatory program.

These are very difficult subjects to resolve. Nuclear powerplants are complicated machines. But I am confident that we do have a dedicated staff that is working diligently to address those issues in a timely manner.

The most important element really of our oversight process is the reactor oversight process, which is the subject of today's hearing. In my view, it is a good structure that objectively and transparently allows us to regulate the Nation's nuclear powerplants. One of the challenges, however, with the ROP, is that many safety issues can be traced to issues that involve management at the facilities. The ROP does not address management issues in and of itself.

But I am encouraged that we are beginning to look at some areas where we can appropriately regulate in this area, such as the inclusion of safety culture initiatives into the reactor oversight process.

I think my biggest frustration continues to be that the reactor oversight process's performance indicators. In too many cases, it takes the agency too long to determine the safety significance of inspection findings that we have. Our experienced inspectors and regional staff recognize poor performance, but at times, they must wait for inevitable findings to move a licensee into the proper column in the reactor oversight process. In other words, we have to wait in many cases for the ROP to tell us what we already know. I think this is an area where we can really work to make significant improvements.

Now I will just briefly touch, in the few remaining seconds that I have, on the importance of openness and transparency. As Senator Alexander and Senator Sanders mentioned, these are extremely important issues for this Commission. We have to continue to maintain the confidence of the public on whose behalf we regulate. As the Chairman indicated, I look forward to answering your questions as we move forward on this important subject. Thank you.

Senator CARPER. Commissioner Jaczko, thank you.  
Commissioner Lyons, you are recognized.

**STATEMENT OF HON. PETER B. LYONS, COMMISSIONER,  
NUCLEAR REGULATORY COMMISSION**

Mr. LYONS. Thank you, Mr. Chairman, and thank you, members of the Committee. It is indeed a privilege to appear before you today with my fellow commissioners to discuss the NRC's programs with a special focus on the reactor oversight program.

I fully concur with Chairman Klein's previous remarks and with his more detailed written testimony. I appreciate this opportunity to share a few additional thoughts.

As he noted, and as several Senators have noted, the NRC's primary strategic goal has been and should always remain safety. In addition, our improved effectiveness and regulatory stability and predictability have helped to create an environment in which operators are prepared to make significant investments. Examples include TVA's restart of Browns Ferry Unit 1, the plans at Watts Bar Unit 2, renewal of licenses for 48 reactors and approval at the NRC over the last 10 years of about 3,000 megawatts of power up-rates.

We are aggressively preparing for a new wave of reactor licensing applications, as my colleagues have said. We have been hiring and training hundreds of engineers and scientists and enhancing our infrastructure. We were very gratified last week to see that first COL coming in to test those processes.

There are many challenges remaining and the most serious one, I think, remains space to house our growing staff. Certainly the subcommittee's support on space issues has been greatly appreciated. But I think we are going to need more help. I believe the agency is well-positioned, looking into the future, with the exception and the continued concern on space issues.

My colleagues have discussed the Reactor Oversight Process or ROP. But I would like to focus on the significant enhancements that were made to more fully and objectively address safety culture. The NRC has made significant revisions, some prompted by your subcommittee, toward inspection and assessment guidance. We have conducted detailed training of inspectors and improved regional management. We have created a multi-office team to promote consistent and effective implementation.

Lessons learned from these safety culture enhancements to the ROP are certainly going to be a benefit throughout the fleet. Future changes and enhancements to the ROP and our annual assessments can also be expected to further improve this program.

Mr. Chairman, in my opinion, the Commission remains committed to fulfilling its statutory role. We appreciate the past guidance and support that we have received from this subcommittee and from the full committee. We look forward to working with you in the future, and I look forward to contributing to questions.

Senator CARPER. Commissioner, thank you very much for your statement.

Let's just jump right into questions, 5 minutes per member. We will have opportunity for two rounds. I think our vote has been moved to 11:35, so maybe we can get through this first round.

Gentlemen, as I mentioned in my opening statement, what I would like to do today is focus on the NRC's action to improve poor performing facilities. Early this week, the NRC announced it was going to begin what I think you called a comprehensive inspection at the Palo Verde Nuclear Plant.

I just want to ask you to briefly explain, if you will, what this comprehensive inspection is and why do you think it is needed at that particular facility?

Mr. KLEIN. Mr. Chairman, as has been stated, we have a rigorous process by which we continuously evaluate reactor performances. When we look at indicators such as those at Palo Verde, and we see declining performance, then we change the amount of time that the utility gets to see us. So our inspection teams are much more rigorously involved, they look at a lot more details. In the case of Palo Verde, we noticed that they had operated for a number of years at the top level. Then they started declining in performance.

So therefore, we moved them into column four, which means they will see us about twice as much as they normally would have if they were a good-performing plant. So we will send—

Senator CARPER. Let me just ask you, any idea what happened, what may have triggered this decline in performance?

Mr. KLEIN. I went out to Palo Verde when we moved them into column four and asked them those questions, what was it that caused it. They believe that fundamentally it was complacency. They were a top performer and they essentially—

Senator CARPER. Was there a change in management, a change in ownership?

Mr. KLEIN. No, it really was not. It was basically a long-term staff that I think reached a comfort zone. They did not have a questioning attitude, they didn't have the ability to follow up to identify problems and then to fix them and to sustain that. If you look at typical reactors that operate well, they will go possibly into a declining mode and they may not realize it. So then there is sort of a denial phase until they bottom out and then they start turning the corner.

So I think Palo Verde was like we have seen in other plants. As indicated, it gets back to people: how to people perform, how do they operate. I think our biggest issue that we have as a regulator is to strive every day, both internally and externally, for ourselves and to the plants, not to become complacent.

Senator CARPER. Just talk to us briefly about their culture of safety. Is it part of what they do every day? I think Commissioner Lyons referred to that. I think one of your enhancements of the ROP process is to start to account for that as well.

Mr. KLEIN. They really do need to watch what they do, every day. When they see issues of concern, they need to bring those forward to management and they need to fix those. When they move into column four, they get a lot of assistance from the NRC. We have increased our number of inspectors, so we will have a lot more people out there. In addition, the Institute of Nuclear Power Operations also has some people out there to help them change the culture.

So we will be watching that, we will be monitoring it. Any time we see declining performance, we increase our activities.

Senator CARPER. If I were running one of these plants, I wouldn't want to end up in either that column, column four or column five. How do they feel about it? I would wear it as a badge of shame and something I would want to get rid of as quickly as I could. Is that the attitude of the management?

Mr. KLEIN. It absolutely is right now. Again—

Senator CARPER. I would hope so.

Mr. KLEIN [continuing]. When plants start, sometimes they don't recognize it, but from my observations, we had Palo Verde come in and appear before the Commission. They know they had problems, they are embarrassed by it, they are committed to fixing it. What we will look at, as a regulatory body, is sustained performance. So they don't just move out of column four because they want to. They have to prove to us that they have moved out, they have to demonstrate it. We will be monitoring that, and we will have an augmented inspection team to watch that.

Senator CARPER. Okay, we will stay on them.

Commissioner Jaczko.

Mr. JACZKO. I would just add, I know the committee has been very interested in safety culture and the work that we are doing to modify the reactor oversight process for safety culture. This is the first time we will be using that new safety culture process at a nuclear powerplant. So as part of the process, Palo Verde will be required to undergo an independent safety culture review that we will monitor and oversee the results of.

Senator CARPER. Good.

Mr. JACZKO. So it will be a new, the first test of that new program.

Senator CARPER. Good. One last question and then I will turn to Senator Voinovich.

GAO's written testimony today suggests that the NRC needs to improve its ability to identify and address early indications of declining safety performance. Let me just ask, do you all agree with this assessment? Have you begun to look at ways to address this particular concern of GAO?

Mr. KLEIN. Mr. Chairman, we have been looking at those way before I arrived at the Commission. When I was at the National Academy of Training years ago, we were trying to look at what predictors, what can we look at that will tell us a plant is going into declining performance. We are continuously looking at it at the NRC. We will continue to look at it. We ask ourselves every day, what can we do better. Then once we find the problems, we back up and say, what should we have asked that would have given us indicators.

So we haven't found that magic bullet, but we are still looking and we will continue to look.

Senator CARPER. Commissioner Lyons.

Mr. LYONS. If I may add, from a standpoint of safety culture, which is relatively new in the reactor oversight process, we have also set up an assessment, to be 18 months from the start of this process, so that we are constantly monitoring and assessing how well we are performing from the standpoint of safety culture.

Senator CARPER. Thank you very much.

Senator Voinovich.

Senator VOINOVICH. Thank you, Mr. Chairman.

I would just to reiterate some of the comments made by my colleagues here today, so that people fully appreciate the importance of nuclear energy. According to NEI, in terms of sources of emission-free electricity in this Country, nuclear provides 73 percent of emission-free energy, wind is 1.4, hydro 24.1, solar  $\frac{1}{10}$  of 1 percent, geothermal, 1.4 percent. So it is significant in terms of the issue of greenhouse gases and climate change.

In terms of reducing voluntary reductions, nuclear generation is responsible for 36 percent of that. The other that comes close to it is natural gas. But we all know, because we have shifted to natural gas, that we have driven up the cost of natural gas about 300 percent, and it has had a dramatic negative impact on the economy of this Country, particularly in my State of Ohio, where at one time we were one of the number one States in terms of plastic.

You all are familiar with Davis-Besse. I am going to ask this question, because it is so near and dear to my constituents. We were very unhappy with Davis-Besse. The question I have is, what lessons were learned there? How have you really changed things at Davis-Besse in terms of what management is doing and in terms of what the Nuclear Regulatory Commission is doing? The other question is, we had a debate, I remember Nils Diaz, the Chairman, about instituting the safety culture in your review of the operations of the various facilities around the Country. There was some reluc-

tance to inculcate that or to include it in your oversight. We want to set some goals, but we don't want to institutionalize it.

I would like to know, where are we, the answer to No. 1, of course, and No. 2, where are we in terms of institutionalized security culture?

Mr. KLEIN. Senator, I think there were a lot of lessons learned from Davis-Besse, both in terms of complacency with the industry and with the NRC as a regulatory body.

We have done a lot of things since Davis-Besse to ensure that that does not happen again. A lot of the talks that I give, I always tell the industry and our staff that our job is to always ask ourselves, what is the next Davis-Besse, and what actions do we need to take to make sure it never happens again. So we continually remind ourselves, internally and externally, to be alert. We expect issues to be brought forward.

I think there were a lot of issues on Davis-Besse that occurred that will not occur again. We have a much more rigorous inspection process for reactor heads, for boric acid leaks, for reactors we inspect. The safety culture that you talked about is now a part of the ROP. So we have done a lot of changes that are locked into our processes.

Senator VOINOVICH. How about the people that are assigned by the NRC to Davis-Besse and other facilities? How have you changed in terms of those individuals?

Mr. KLEIN. We did training and more training, so that they ask the right questions, and so they look for different things. We did a lot to refocus the inspection, not just at Davis-Besse, but at all plants, to have a more questioning attitude.

Senator VOINOVICH. Have you changed the tenure of the amount of time? Because one of the things that many of us were concerned about if somebody is on the job for 4 or 5 years and after a while you kind of get to know everybody, and before you know it, you don't get the kind of oversight that you would like to have.

Mr. KLEIN. We do limit the time that resident inspectors can stay at plants. That is one of our policies. People's time can be extended, but they have to make a big justification. Typically it might involve family reasons. If someone is about ready to graduate, we might let them stay, their family member is graduating, we might let them stay another year.

Senator VOINOVICH. How much time is that?

Mr. KLEIN. A maximum of 7 years, but typically it is about 5.

Senator CARPER. Mr. Lyons.

Mr. LYONS. Another very important lesson learned that I might add, from Davis-Besse, was the importance of operating experience. That led to our revitalizing our entire operating experience program. I was surprised when I came onto the NRC and began to do a fair bit of reading that there were previous events, not only for Davis-Besse, but also for TMI, that had we had a robust operational experience program, we and the operators should have been aware, we should have anticipated that possible issue and been looking toward it. Operational experience is a very important component today.

Senator VOINOVICH. I have run out of time. Maybe in answer to some other questions here, I really am interested in where are we with this whole issue of security culture.

Senator CARPER. Good. That is a good one to focus on some more.

Senator Sanders, you are next, and you are recognized at this time. Five minutes, please.

Senator SANDERS. Thank you, Mr. Chairman.

Before I ask my question, I have heard a whole lot about a renaissance in energy, and I believe in a renaissance, too, not quite the same renaissance as some of my colleagues. I think the renaissance has to take us from being behind the rest of the industrialized world in energy efficiency to be first in the world. There are unbelievable gains that we can make in that area.

I think a renaissance means that we begin to invest a fraction of the money we put into nuclear energy into solar, into wind, into geothermal, into biofuels. I believe that in moving in that direction we can create millions of good-paying jobs as we create safe and sustainable energy. That is my vision of a renaissance.

But to be more specific, Mr. Klein, on August 21, 2007, very recently, one of the cells of the cooling tower collapsed at the Vermont Yankee Nuclear Powerplant. You know this. On August 30, just a week later, there was an emergency shutdown involving stuck valves. Fortunately, no one was hurt in either of these accidents. If you were living in southern Vermont or New Hampshire or Massachusetts, would you have confidence in the NRC after this series of events?

Mr. KLEIN. Senator, sitting at this side of the table, I would hope the people of Vermont have confidence in the NRC.

Senator SANDERS. They don't.

Mr. KLEIN. The issue on the collapsed cooling tower, there are about seven cells on that cooling tower. I would agree with you that the public confidence, when you see that visible collapse, is a concern. I think it would question the maintenance, the safety and so forth. I believe as a regulator we need to talk to the public, let them understand what those issues are.

It is important to note that that cell that collapsed was not part of the safety system. So in terms of the public being at risk from a safety standpoint, they were not at risk.

Senator SANDERS. That is true.

Mr. KLEIN. But it does, I will agree that it does, I think, cause people to have concern about the confidence of the other things. That is one of the things the NRC looks at. When we see an event like that, we ask ourselves, are there other factors that we should be looking at.

Senator SANDERS. Let me pick up on that. Given the fact that Yankee is now anticipating a 20-year extension, is now anticipating, is in the process of an up-rate, will the NRC commit to reinspect Vermont Yankee with new procedures, a new examination? Will you commit now to do that?

Mr. KLEIN. Because of this particular licensing phase and the role the Commission plays, an adjudicatory role, I have to be careful what I say in terms of the license extension. My general counsel will have comments on that. But I can assure you that we will

have a rigorous inspection both by the staff and by the Commission.

Senator SANDERS. When will that be done?

Mr. KLEIN. It is in the review process now. So as the staff gives its recommendations, the Commission will be looking at those issues.

Senator SANDERS. Will the NRC use your new procedures as a look back at Vermont Yankee or a side by side comparison of the two procedures since the Vermont Yankee plant was granted an up-rate in March 2006?

Mr. KLEIN. The new reactor oversight program issues that we have at all the plants include Vermont Yankee.

Senator SANDERS. Mr. Chairman, you indicate in your statement that the new procedures are superior to the independent review that was used at Maine Yankee? Right?

Mr. KLEIN. Correct.

Senator SANDERS. Yet I don't know how you can say that, because in one very important way it is far inferior, and that is, you do not involve independent inspectors, you do not involve governors. You continue to control the process strictly here from the NRC in Washington at a time when a lot of people do not have particularly great faith in what goes on here in Washington.

Will you agree, and this is a request similar to what Senator Clinton made for nuclear powerplants in New York State, will you agree, will you work with us to develop an independent inspection which involves State Government in Vermont, New Hampshire, which involves independent engineers who are outside of the jurisdiction of the NRC?

Mr. KLEIN. Maine Yankee's independent safety analysis was also run by the NRC and involved—

Senator SANDERS. But involved outside engineers as well?

Mr. KLEIN. Outside engineers, for example, from the State, can also participate in that process. They probably, I believe for Vermont Yankee, that they are already involved.

Senator SANDERS. Well, key word here is the word involvement, how much power the State has and how much power independent engineers have. Would you agree to allow Vermont Yankee to receive a similar type inspection as to what Maine Yankee received?

Mr. KLEIN. I believe that Vermont Yankee has that same activity and it is more rigorous than Maine Yankee had.

Senator SANDERS. Well, you haven't answered my question. Would you agree to allow a process similar to Maine Yankee to take place?

Mr. KLEIN. We have a process that basically involves the State. As a regulatory body, we hold that decision in terms of, we have the responsibility and the accountability for that plant.

Senator SANDERS. Okay. Let me just say this. In Vermont, and I think in many areas of this Country, there is concern about Washington's ability to do the right thing for people, especially in an issue as important as nuclear power. I would hope that you would reconsider, and we are going to work on this issue.

Last point that I want to make, maybe there is somebody that could answer it. Our friends here talk about the renaissance and the explosion of nuclear energy, more and more powerplants. I am

not sure where this nuclear waste is going. I would just mention to my friends, we are looking at Senator Ensign of Nevada's Web site, who says that he continues to vigorously oppose efforts to move high level waste to Nevada. I would tell you obviously that the Majority Leader from Nevada is also opposed to dumping nuclear waste, as other people of Nevada.

So before we think about building dozens of more nuclear powerplants, somebody might want to ask the simple question, what are you going to do with that waste? Thank you, Mr. Chairman.

Senator CARPER. Thanks, Senator Sanders.

Let's go over to Senator Craig next.

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

Chairman Klein, a matter of terminology. Twenty-seven years ago, I began to work with our lab in Idaho, and I had to go through a whole educational process that remains ongoing. But one thing I found very difficult to do was to get a nuclear engineer, a nuclear physicist to speak in plain and simple language, so that the world could understand them without being alarmed.

You used a phrase a moment ago that the average person reading it would say, what was nuclear material leaking into a glove box for. A glove box is a compartment in a vehicle by which one stores ones gloves. In a nuclear plant, what is a glove box?

Mr. KLEIN. The particular issue that we were describing was nuclear fuel services.

Senator CRAIG. All right.

Mr. KLEIN. It is an enclosed facility whereby nuclear materials are handled. So those that are operating with the material do not get exposed.

Senator CRAIG. It is a very thick-walled, cumbersome—

Mr. KLEIN. Very thick, very cumbersome.

Senator CRAIG. So it is not in a vehicle driving away from a facility.

Mr. KLEIN. It is not. You have several at the Idaho National Laboratory.

Senator CRAIG. We do that. I understood what you were saying, but my guess is the average person or maybe the average person reporting this hearing, except for the industry itself, might not quite understand what a glove box is. Anyway, having said that—

Mr. JACZKO. Senator, if I could correct the situation. The material actually spilled out of the glove box, so it was actually spilling out onto the floor. While the glove box is generally a protected enclosure, the material was not intended to be in that glove box. In fact, it spilled out of the glove box onto the floor, just to clarify that.

Senator CRAIG. Okay, but not a vehicle.

Mr. JACZKO. No, it was not a vehicle.

Senator CRAIG. Thank you very much.

I am interested in your capacity to do what you do well in a period of growth. I think Commissioner Lyons, you began to talk about space. Anticipating what you are now anticipating, and that is more and more application coming and the ability to review them properly with the kind of talent that must be there to do so, talk to me about, if you would, your experience in finding the right

people and the staffing responsibilities that you now have or sense, and what that will mean for the Commission. It is obvious you are thinking space, Commissioner Lyons, and that space will be filled by people and equipment or computer and facility. If you would for us, visit us on that issue.

Mr. LYONS. Senator Craig, we are working very aggressively to increase the staff levels at the NRC. We are doing that based on the anticipated number of applications and reviewing the staffing that we require to efficiently process those applications. Our goal has been a net hiring of about 200 per year, but of course, we also have to account for significant attrition of the staff, typically of the order of 6 percent. But we anticipate that as more people at the agency, such as me, have more gray hair, that the attrition number may continue to go up.

In any case, the hiring is a challenge. We have brought in on the order of 400 or 450 people in the last year in order to achieve the goal of increase of a net 200. That hiring is a challenge. We are competing, of course, with many other entities that are also hiring. To the extent that there is a nuclear renaissance, those utilities are going to be hiring, adding to still further pressure.

So far we have been extraordinarily successful in that hiring. However, we are not so successful in where to put those people. We are bursting at the seams in our facilities in Rockville. We now have people in two additional rented facilities. We were about to have people in a third rented facility. There are discussions that have been ongoing with the subcommittee for assistance in working with GSA on another facility.

I might note that spreading our personnel among a number of different locations, to me is absolutely the worst thing that we could be doing. In the aftermath of TMI, one of the findings was that the NRC at that time was spread among 11 buildings, I believe. It was far before my time. That is not the way to run a regulatory agency. With, we hope, continued assistance from the subcommittee, hopefully, and working with GSA, we can obtain the needed facilities and avoid this piecemeal placement of people around the Maryland area.

Senator CRAIG. Okay, well, we will watch that very closely with you, because it is key and important for us. One last question—I guess I am out of time.

Senator CARPER. You will have another chance.

Senator Cardin.

Senator CARDIN. Mr. Chairman, thank you very much.

Commissioner Lyons, let me just follow up on the facility issue, because this committee has approved a prospectus for the consolidation of facilities in Rockville. So I would just urge you to please feel comfortable to keep this Senator informed as to how that is proceeding. Because I am interested in making sure you have adequate space and that the facilities are consolidated.

Mr. LYONS. Senator, to be sure that I was clear on that point, we very much appreciate the approval of the prospectus. The issue with the GSA now, and for which we may need assistance from the subcommittee, is the details of that prospectus, which, as it is now approved and written, prescribes a 2½-mile radius around the existing facility and a per square foot cost that we do not believe is

likely to attract any bids anywhere close to our present facility. This is a concern that we will be continuing to discuss with the committee. But the prospectus, as you say, was approved. It is the parameters of the prospectus that are of concern.

Senator CARDIN. We will watch that very closely. The information we had is that it would be adequate. If it is not, we certainly want to know that. We will be very closely watching this to make sure that you have adequate facilities. So please feel comfortable to at least keep this Senator informed as to how that is progressing.

Let me respond, if I might, to my good friend, Senator Sanders. I am on his bill on global warming, which is the right way to proceed. I support what he says as far as wind and solar and other alternative energy sources. But the renaissance in energy has to include all of the above. It has to include wind and solar and alternative fuels. But nuclear is part of it. We are on nuclear, we have nuclear. So let's make sure we get it right. I think that is the main purpose of this hearing, to make sure that we do this in the right way.

I want to go back to the procedures you have in place in regard to inspecting the security at our nuclear powerplants. I mentioned Peach Bottom in my opening comments, where a worker felt uncomfortable to bring to the regulators a circumstance in which one of the fellow employees was found asleep who had major responsibility for the security of that plant. Now, that wasn't the first time that Peach Bottom has been cited. In the 1980s, they were cited. Of course, the operator of Peach Bottom also operates Three Mile Island, which has a real history. The security firm, I believe, is the same security firm that was operating at Three Mile Island.

So my question to you is, first of all, what procedures do you have in place to make sure that there are inspections as to the security at the nuclear powerplants, and if you can comment on Peach Bottom, I would certainly appreciate it.

Mr. KLEIN. Let me make it very clear, sleeping guards are unacceptable, both for the regulator and for the operator. It turns out that we had received an anonymous complaint about the sleeping guard issue several months ago. We investigated it. The unfortunate aspect was that it was an anonymous complaint and we couldn't talk to the individual to find out exactly what it was. The sleeping guards in question were in the ready room as opposed to being on station. Clearly, they should not have been sleeping, no matter whether they are on station or in a ready room.

The investigation that we conducted did not verify the sleeping activities. We had no evidence, and as you might expect, it is hard to walk in at that right time and catch someone doing that. What we have done since then, once it was identified, we sent an alert to all the utilities, all of our resident inspectors, to be alert, to be attentive, watch for those signs. We sent an augmentation team to look specifically at Peach Bottom. That report has not yet been briefed to the Commission. But we will be holding a public hearing on that aspect on October 9th in Peach Bottom. Clearly it is unacceptable, we don't expect that to happen again, and we will be watching it.

Senator CARDIN. I believe there is video. So there is documentation of the circumstance.

Mr. KLEIN. The initial one was not. The initial complaint was just a verbal. But the individual did have pictures, videos that were provided later.

Senator CARDIN. Maybe I should ask that, if you would for the record, supply what requirements you have, what procedures you have in place to inspect the security arrangements at the nuclear powerplants. I would hope that you do some form of random inspection, some sort of independent review, including interviewing employees, to see whether there is a laxity toward security at our nuclear powerplants. I think all of us understand we won't tolerate sleeping guards. The question is, what procedures do we have in place to make sure that that doesn't happen?

Mr. KLEIN. We do have a rigorous inspection program for a lot of aspects of security, including physical barriers, procedures, practices, the guard stations. We do have resident inspectors that go out and talk to people. We have inspection teams that go out and talk to people. In this case, it appears preliminarily that there was an agreement among one shift where they looked out for each other, and it was a behavior that was difficult to find. We are going to reexamine our processes to see if there is something that we could have and should have done that would have caught that. But we are looking at that.

Senator CARDIN. I would ask that the results of your investigation and hearings, that our office be kept informed. Thank you, Mr. Chairman.

Senator CARPER. Senator Alexander, I don't believe you have had a chance to ask questions yet, is that correct?

Senator ALEXANDER. That is correct.

Senator CARPER. Well, have at it.

Senator ALEXANDER. Thanks, Mr. Chairman. I was thinking about my friend from Vermont and his call for efficiency. I agree with that, and I hope that as we work together, we can, I would like to turn his definition of efficiency more to buildings and appliances where there is a lot of room for gain. I would hope he would agree that it wouldn't make efficient sense to spend a lot of money building powerplants that don't work most of the time.

For example, it wouldn't make much sense to spend a lot of money building giant wind turbines all over your beautiful mountains that only work a third of the time. If they are in Tennessee, at the only wind farm in the entire southeastern United States, they don't work 80 percent of the time. During August, when we are all sweating and our air conditioners are up, the average amount of time they don't work is 93 percent of the time, when nuclear power is producing electricity, on the average in TVA's region, is producing clean electricity, emission-free electricity, more than 90 percent of the time. So I think nuclear power is likely to be the most efficient supplier of large power. Although I am hopeful that maybe we will have solar, thermal power some day that will be more efficient.

I want to ask you a question, if I may, about low-level radioactive waste and the disposal of it. I know that is a State responsibility. But let me try to put it in human terms. We have St. Jude's Hos-

pital in Memphis. They help children who are sick with cancer at St. Jude's, 2,500 children a year inpatients, 58,000 outpatients. It is a celebrated place. They give 5,500 radiological treatments a year. They produce low-level radioactive waste in many different ways, which has to be disposed of somewhere.

Our State, this is not your fault, our State is not part of a compact that has a place to dispose of that. The Barnwell, SC place where it now goes is closing next year. So that means, so my question is, what are the options and what responsibility does the Nuclear Regulatory Commission have with this? This doesn't just affect St. Jude's Hospital in our State. Sequoia, TVA's nuclear plants have low-level radioactive waste. Private companies that reduce the volume of low-level radioactive waste have to then send it somewhere.

Our research universities and hospitals at Vanderbilt and at the University of Tennessee have all this. If we can't send it somewhere, which apparently we can't after the middle of next year, we have to store it on site. There are some potential problems with that. As I understand it, that is primarily a State regulatory responsibility. But I believe you have some oversight.

So my question is, what can you tell me about the future of the disposal properly and safely of low-level radioactive waste in a State like Tennessee from St. Jude's Hospital, research universities, from our nuclear plants. What can we do with it? Or if it is kept on site, what should the State be doing or what should you be doing to make sure that it is properly secure?

Mr. KLEIN. Senator, you have touched on an issue that has serious consequences for the entire Nation. As you indicated, the process that the Senate and Congress had looked at a number of years ago for the compacts were States would get together and dispose of low-level radioactive waste has not exactly been a successful program. It has been a very contentious one, very difficult.

For the nuclear powerplants that we regulate, they have the advantage that the hospital that you mentioned does not, and that is, space. They can compact, they can store it on site if they need to. Currently the site that is most likely to be used will be the one in Utah, the Clive facility. That facility will accept waste from other States, so that is an option.

But I can tell you, in my previous position at the University of Texas system, we built a building in West Texas to consolidate the radioactive waste, to store it while we were waiting for the low-level waste site to get licensed in the State of Texas.

Senator ALEXANDER. Who regulated you? Did you regulate yourself? Was there a State agency that did that?

Mr. KLEIN. We were regulated by the State. The State of Texas is an agreement State, so we were regulated by the State.

Senator ALEXANDER. Does the NRC have a division that oversees what States are doing to regulate low-level radioactive waste?

Mr. KLEIN. Most States follow our characterization of the waste, like Class A, Class B, Class C. So we have designations. They follow our guidelines.

Senator ALEXANDER. But on B and C, do you oversee what a State like Tennessee would be doing about onsite inspection of low-level radioactive waste?

Mr. KLEIN. In general, that is a responsibility of the State.

Senator ALEXANDER. Thank you, Mr. Chairman.

Senator CARPER. Thank you, Senator Alexander.

We will start a second round of questions, and I think we are going to have a vote about 11:55, and it would be great if we could complete our questioning of this panel before we may have to take a short break to run off and vote.

Gentlemen, the GAO testimony that we will hear in a couple of minutes mentions that the NRC intends to contract commercial companies to assist the NRC in reviewing the safety and environmental portions of a number of these applications we are looking forward to. What exactly would these commercial companies be doing? Are any of these companies doing any work for any current licensees?

Mr. KLEIN. Senator, as you might expect, the NRC as most areas, oftentimes at the encouragement of OMB because of full-time equivalent limitations, contracts technical work. So we do have some companies, national labs included, that provide us technical assistance. But the NRC makes the decisions.

Senator CARPER. All right. Can you give us some better idea, my question is, what exactly would these commercial companies be doing? Are any of those companies currently doing work, to your knowledge, for current licensees?

Mr. KLEIN. We have a fairly rigorous program, so that there is no conflict of interest. Before we award contracts, our legal team looks at contracts to make sure that there is no conflict of interest.

Senator CARPER. Would any of the commissioners like to explain for us the nature of the work that these commercial companies would be doing?

Mr. JACZKO. In general, Mr. Chairman, if I could, generally for the new reactor work, we are anticipating about a third of the contract, a third of the work on reviewing reactor application be done by contract, or by a variety of contractors. Generally what the process involves, it is a process that we currently follow when we do environmental reviews. The contractor will provide generally a first draft, of certain aspects of the document in question, if it is an environmental document or if it is a safety document.

Then what will happen is, after they have done that first draft, they will get together with the agency staff. The agency staff will then review it and take responsibility for the document and for the work.

With the new reactor work, they will also be involved in developing some of the questions that we will ask for applicants. But again, it is a very rigorous and controlled process that is presented to the staff. The staff then makes the final determinations about what questions to ask and the answers and whether or not they are acceptable.

So it is a process where initially, for some of the technical document development, the contractors will provide work to the staff and then ultimately the staff takes responsibility for that and produces the final document.

Senator CARPER. That is good to hear, thank you.

We have already talked, several of our colleagues have already raised the issue of space. I am not going to get into it here, but

Senator Voinovich, Senator Cardin and myself are very much interested in making sure that you have what you need to maximize your efficiency, to enable you to do your jobs as best you can. To the extent that we can be helpful in that process, we want to. I will just leave it at that, let's continue to have a good dialogue.

Mr. KLEIN. We appreciate your past support and we look forward to your future assistance.

Senator CARPER. Thank you.

Mr. JACZKO. Senator, if I could add real quickly to that. The practical reality, however, is that we will not be consolidated while we do the bulk of this new reactor work. The help that the committee has provided to us in particular has been on acquiring a new building or new construction. That will take at least, probably 3 years until we can move into that space. So over the next 3 years, we are going to be in a variety of locations. That will not be an optimal situation for us.

Senator CARPER. OK. I believe there are currently 10 reactors in column three of the NRC's action matrix. Could you all just briefly describe what exactly does it mean to be in column three? If you believe these plants are improving, or they may require even further oversight?

Mr. KLEIN. When a reactor moves into column three, they get a lot more guidance from the NRC, both from headquarters, from the region and from resident inspectors. It is a trend that we have been watching. One of the concerns that we have as a regulator is that we don't lose focus on that existing fleet while we look at these new reactors coming at us.

So we divided up the Agency into offices having operating nuclear reactor oversight separate from the new reactor organization, in order to maintain focus on that existing fleet. So we watch those reactors, I think our resident inspectors and the regional offices are doing a very good job. We are finding things where the utilities are not being as rigorous as we would like. When that happens, they move into higher oversight, which the reactor oversight program does. That means that when we see declining performance, we spend more time at that facility to ensure public health and safety.

Senator CARPER. Commissioner Lyons?

Mr. LYONS. Just a comment that any licensee whose plant is in column three certainly has a very strong motivation for movement back into No. 1 or No. 2.

Senator CARPER. How would you describe that motivation?

Mr. LYONS. From any number of standpoints. The increased assistance, as the Chairman referred to it, the regulatory oversight that we are providing, could be viewed as a burden to the licensee. I am sure it is a burden to the licensee. But it is also something that we regard as absolutely essential in trying to reverse declining performance.

But a plant in column three has two directions to go. We are doing our level best to move them back in the correct direction. I believe licensees are, too. But we are carefully assessing their progress as they are in column three.

Mr. KLEIN. One specific incentive that they have is because we are 90 percent fee recoverable. They get to pay for the assistance we provide them.

Senator CARPER. Well, that ought to be a pretty good incentive. My time is expired. Senator Voinovich?

Senator VOINOVICH. Senator Sanders mentioned efficiency, energy efficiency. I might mention that a lot of our facilities could be a lot more efficient if we didn't have the controversy over new source review, which is still in the courts, and people are uncertain about what they can or cannot do. I am not sure that affects your operations, new source review. But you have improved the efficiency of the nuclear powerplants throughout the United States. My understanding is that they have made them more efficient, they are generating a lot more megawatts than they originally had anticipated and they continue to move up and you take that into consideration in your relicensing. Is that right?

Mr. KLEIN. That is correct, Senator. If you look at the efficiencies in the 1980s, it was in the 60 percent efficiency factor. Most of these plants are running now in the 90s. A good part of that is the practices of the utility themselves, but also the oversight.

Senator VOINOVICH. So they are generating more megawatts than the did originally when they were built?

Mr. KLEIN. A lot better.

Senator VOINOVICH. We have benefitted from that during this interim when we haven't built any new facilities?

Mr. KLEIN. That is correct.

Senator VOINOVICH. We were talking about Peach Bottom and what happened there. Then we talked about Davis-Besse and the issue of institutionalizing the security culture. How do you measure, I mean, would I, at the time of Peach Bottom, if I looked, what are the indicators that you would look at, versus Davis-Besse, as to whether or not they had institutionalized security culture? I would hope that because of Davis-Besse that you would see a marked difference between Peach Bottom and Davis-Besse. How can you determine who is doing the job and who is not doing the job?

Mr. KLEIN. On the safety culture—

Senator VOINOVICH. Yes, safety culture, not security culture.

Mr. KLEIN. On the safety culture that we look at, again we have different training, we look at different characteristics, we certainly look now at vessel head maintenance and inspections. So we do a lot more inspections regarding a Davis-Besse now than had been done in the past.

Another thing that we are doing that is fairly simple to remind us as a regulator that we must not become complacent is building a small model of the corroded Davis-Besse vessel head to put in our building lobby.

Senator VOINOVICH. OK, but I want to get at what is the, Greg, you might mention this, how do you determine whether you go into a facility and you look at it and you say, wow, they have a real safety culture here. Under this culture you are not going to find somebody sleeping on the job, or people are paying attention. How do you determine whether that exists or doesn't exist?

Mr. JACZKO. We have, as part of the new reactor oversight process, we have implemented a new safety culture program. The heart of that—

Senator CARPER. Let me just interject for a second. We just started a vote at 11:47. Would it be all right for me to run and vote? I know you have to vote, and then have—

Senator VOINOVICH. Go ahead.

Senator CARPER. Let me just do that, and I will be back within 2 minutes. Thanks very much.

Mr. JACZKO. The heart of that program is that whenever we find we get a finding from one of our inspectors, if that finding is what we call a green finding, one of the lowest of the significance of the findings, when we get a series of those, we review all of those findings for what we call cross-cutting issues. So those are—

Senator VOINOVICH. [Presiding.] What do you mean by findings?

Mr. JACZKO. So if we identify that a plant has violated some aspect of our regulation, and that is done through an inspection, through our normal inspection process. When we do that, we look at that, and particularly those large numbers of findings we get, or inspection problems that we identify. We look at those and we look and see if they fall into a series of bins. Those bins are really geared toward identifying the elements of safety culture, things like, do you properly identify problems.

When you identify problems, do you properly disposition them through the corrective action program. If we see trends in that area, then we can initiate a kind of process involving the safety culture review, which can involve things like having surveys done of the employees to see what the safety culture is like. We usually have the licensees do that through a contractor, and these contractors do this throughout the industry. So they can often then compare the safety culture performance at a licensee with safety culture throughout the industry.

So that is one of the main areas. The more comprehensive approach then involves somebody—

Senator VOINOVICH. You are in management, and you have various management throughout the Country. Don't you have some kind of objective that says, if you are going to have a place that is going to have safety culture, then there is a series, a training program that should be adopted. They pretty well agree that that training program is an outstanding program and that this outfit, this facility has taken on that training program. Everybody has been in it. They periodically review it to make sure that it is up to snuff, they renew the lessons learned, they have an orientation program for new people that come into that.

Don't you have some kind of standard thing you look at?

Mr. JACZKO. The simple answer, Senator, in my view, is that we don't. Safety culture is not a regulatory requirement for the NRC. It is something that we have tried to incorporate into the oversight process. But fundamentally, it is not a regulatory requirement. It is certainly an area that I believe we need to look at more definitively to establish some kind of more standard program as you have described.

But it is very controversial, quite frankly, because we are getting very close then into management issues. As I indicated in my initial remarks, we don't regulate management.

Senator VOINOVICH. Well, that is a lay-up shot. I mean, if you have a program that everyone agrees is a good program and they

are required to have it, and they are required to have periodic reviews of it, orientation for new people, I don't see how anybody can object to that kind of oversight.

Mr. JACZKO. I really agree. I think it is something that we should take a look at and we need perhaps a more involved program than we have right now.

But certainly the program we have right now is in a pilot phase, we are looking within 18 months, as Commissioner Lyons said, we will go back and reevaluate that and see, did it provide us with enough information to properly evaluate safety culture. If it doesn't, then we will have to look at some of these other areas, I believe.

Mr. KLEIN. Let me clarify. There is a—

Senator VOINOVICH. I want to get Senator Sanders in.

Senator SANDERS. I didn't mean to interrupt. We have a vote in a minute, I just wanted to ask a question. Thanks. I apologize.

Mr. Klein, a moment ago, you mentioned an independent safety culture review would be conducted at the Palo Verde Nuclear Plant in Arizona. Now, what interests me is the word independent, because the legislation that I have introduced calls for an independent safety assessment. Does that review in Arizona involve independent contractors and representatives appointed by the Governor of Arizona?

Mr. KLEIN. It does not. It is an independent look at the safety culture.

Senator SANDERS. What do we mean by the word "independent"? To my mind, it is that we have some independence from just the NRC. So I am not quite sure that the word independent is totally correct in this context.

Mr. KLEIN. It may not mean the same independence as you are referring to. This is a look by people who are trying to give us guidance on a safety culture, as Commissioner Jaczko indicated. We are trying to learn what characteristics do we look for that demonstrates a good safety culture.

Senator SANDERS. Fair enough. I would hope that you will be more open to a truly independent process which involves State officials and engineers not appointed by the NRC. I think that would give a lot of confidence to the people of the given communities.

I wanted to just jump to another question before we leave and vote. Nobody up here, or in the NRC, knows what is going to happen with Yucca Mountain. It is a political debate, it is in the courts, there are environmental concerns, et cetera. When I hear people talking about dozens of new nuclear powerplants, has it occurred to people that we may not have a place to put all these lethal nuclear waste? What happens if Yucca isn't approved? Mr. Klein or anybody else, what do you do then?

Mr. KLEIN. As the regulator, we will review an application, once we receive it, from the Department of Energy. So as a regulator, we would evaluate the impact of termination of the Yucca Mountain program.

Senator SANDERS. You didn't answer my question. It is a very simple question. People here are talking about the construction of many, many new nuclear powerplants. I am not convinced that you know what to do with this highly lethal, high-level waste that is

going to be produced if Yucca does not turn out to be the repository that we are talking about.

Mr. KLEIN. Currently, we license at-reactor storage in dry cask containers that is safe. The Department of Energy is also looking—

Senator SANDERS. That is safe, is that what you just said?

Mr. KLEIN. It is safe.

Senator SANDERS. But do you know that there are many people who are concerned about having high-level waste in dozens of locations around America?

Mr. KLEIN. A lot of sites, most sites now have run out of space in their spent fuel pool and have dry cask storage. That can be done safely up to 100 years. DOE is looking at other options, including recycling.

Senator SANDERS. Safely is a big word when we have Osama bin Ladin and other people running around as well. I hope you will recognize that.

Mr. JACZKO. Senator, if I could add.

Senator SANDERS. Yes.

Mr. JACZKO. The NRC has looked, in particular, at the issue of dry cask storage and storage at reactor sites. When we say safe, it is very, very safe. This is something that we have done extensive studies on, looking at the safety as well as the security aspects of the dry cask storage fuel. It is something that from a risk perspective, the risk is very close to zero, really, for any kind of public health consequences from the storage of this fuel.

Senator SANDERS. You are aware that there are people, who are quite knowledgeable, who have very serious concerns about the safety aspects of having dozens and dozens of locations in this Country which contain high-level nuclear waste, at a time when we are under terrorist attacks. In some cases, this waste is located near rivers and so forth. You are aware that, your opinion, which I respect, is not held unanimously, is that true?

Mr. JACZKO. I certainly can't comment on other people's opinion, but I would say, we have looked extensively at these issues, and we do believe that this is an area that, in my view personally, it is certainly not the most significant issue that we would look at in a nuclear powerplant. We have security regulations and we are currently reviewing those security regulations right now for those dry cask storage facilities. We have looked at these issues.

Senator SANDERS. Mr. Lyons, and then I am going to have to run.

Mr. LYONS. Senator Sanders, if I could, to me there is a clear distinction between the responsibility of the NRC for safe storage, and I fully agree with my colleagues that we are assuring safe storage. But there is a big difference between our assurance of the safety and I believe the public policy issues that Congress has to deal with from the standpoint of an overall national spent fuel policy. At the moment, we have a Waste Policy Act which says the DOE must work towards Yucca Mountain.

But there certainly are other technical options for management of spent fuel, and it will be up to Congress to evaluate those other possibilities.

Senator SANDERS. All that I am suggesting, Mr. Lyons, is that in the real world, I don't think anybody up here can guarantee you with absolute certainty that Yucca Mountain is going to be the repository. What I am hearing from Mr. Jaczko is that we may be looking at dozens and dozens of repositories all over this Country, which I can assure you some very smart people have safety concerns about.

I have to run to vote. Thank you.

Senator VOINOVICH. We are going to recess for the vote, and allow the next panel to get ready. We thank you for being here. There are lots of questions that still haven't been answered. The record is going to remain open so that members of this committee can submit them to you in writing. We really appreciate your devotion to making sure that the renaissance takes place.

We are recessed.

[Recess.]

Senator CARPER [Presiding]. The subcommittee will come to order.

I am going to invite our second panel to come forward and to join us at this time. The good news is I don't think we are going to have any other votes immediately. If we are lucky, we will be able to proceed through this panel and ask you questions and conclude for the day.

On this panel we have three folks. Mark Gaffigan is the Acting Director of the Natural Resources and Environment of the Government Accountability Office. David Lochbaum, Director, Nuclear Safety Project, Union of Concerned Scientists, welcome. Thank you for joining us today. Marvin Fertel, Senior Vice President and Chief Nuclear Officer of the Nuclear Energy Institute. We are delighted that you are here. Your entire statements will be made part of the record. I will ask you to summarize in about 5 minutes, and then we will ask some questions of you.

Mr. Lochbaum, I am going to ask you to lead off for us, then we will turn to Mr. Fertel and then Mr. Gaffigan.

**STATEMENT OF DAVID A. LOCHBAUM, DIRECTOR, NUCLEAR SAFETY PROJECT, UNION OF CONCERNED SCIENTISTS**

Mr. LOCHBAUM. Mr. Chairman, on behalf of the Union of Concerned Scientists, I want to thank you for this opportunity to present our views. We evaluated the Nuclear Regulatory Commission against four attributes established by an international organization in 2001. The bad news is that the NRC got failing grades on two of those attributes. The good news is that the NRC easily passed one attribute. The best news is that the necessary reforms are ready to be applied to the Nuclear Regulatory Commission.

The first attribute was, ensure that an acceptable level of safety is being maintained. For the past 30 years, UCS has seldom contended that the NRC's regulations were too lax. Our positions consistently matched by the regulations made by the GAO, the NRC's Inspector General and other public interest groups that implicitly concede that these regulations are adequate. The NRC's probe into Davis-Besse recommended 49 things the agency should do to fix that problem. Only 6 percent of those recommendations involved

changes to existing regulations. So the NRC got a passing grade for establishing an acceptable level of safety.

The second attribute was, take appropriate actions to prevent degradation of safety. Whereas the first attribute sets the safety bar at the proper level, this attribute protects against any nuclear reactor doing the limbo beneath that safety bar. The NRC gets a failing grade in this area. Among many examples that we could cite are, since 1966, there have been 51 reactor outages lasting 1 year or longer to return to the proper side of that safety bar. An effective regulator would not let safety levels repeatedly drop so low as to require more than a year to fix.

Beginning in 2002, the NRC has conducted more than a dozen inspections at reactors seeking power up-rates, and has never identified a single problem at any one of those reactors, despite many power up-rate related problems that late forced these reactors to shut down or reduce power. Eighteen months ago, the Nuclear Regulatory Commission ordered that emergency sirens for the Indian Point Nuclear Plant in New York be provided with backup power. In April of this year, the NRC proposed a fine when that deadline passed. The company paid the fine and committed to comply with the order by August of this year, which has now also passed without compliance.

The NRC's regulations permit a \$130,000 fine per day to be levied. The NRC could have fined Indian Point over \$22 million for the 171 violations of the days to date, but instead applied a one-time fine of \$130,000. Instead of aggressive enforcement regulations, the NRC is a meek and mild enabler of non-conforming behavior. The NRC gets a failing grade in this attribute.

The third attribute is performing regulatory functions in a manner that ensures that operating organizations, the general public and the Government have confidence in that performance. There is considerable talk today and elsewhere about independent safety assessments reflecting lack of confidence in the NRC. After all, if the NRC were trusted, there would be little interest by governors, public service commissions and the public in extraordinary inspections.

There are plenty of other indicators showing the NRC deserves a failing grade for this attribute. The States of Massachusetts, New Jersey and Vermont are currently legally intervening to oppose changes at nuclear reactors in their States supported by the Nuclear Regulatory Commission. Because this lack of confidence is real, UCS supports S. 1008, introduced by Senator Sanders, as a means of restoring confidence in the NRC.

The fourth attribute is striving for continuous improvements in performance. This criterion is merely striving for continuous improvements. The NRC has self-assessment processes for and solicits external stakeholders about its regulatory programs, attesting to striving. But chronic inability to benefit from these efforts is hardly basis for a passing grade. Thus, the NRC gets neither a passing nor a failing grade in this area.

The good news is that the NRC is very much like Davis-Besse, Palo Verde, Millstone, Salem and the other poorly-performing plants before their reforms. The reforms these sites took involved two common threads. One was bringing in senior managers from the outside to drive the necessary reforms, and two was improving

the safety culture so the entire organization was properly focused on safety.

The NRC suffers from these same chronic performance impairment but has never received the same treatment. Thus, the NRC remains marred at the same level while these other plants are operating much better today. The NRC can't get any better until senior managers are brought in from the outside who can be agents of change instead of agents of status quo.

On behalf of the Union of Concerned Scientists, I thank you for conducting this hearing and for including our perspective. We look forward to the steps you take to bring about the needed reforms at the NRC. Thank you.

[The prepared statement of Mr. Lochbaum follows:]

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

Mr. Chairman and members of the subcommittee, on behalf of the Union of Concerned Scientists (UCS), I thank you for this opportunity to present our views on the Nuclear Regulatory Commission's (NRC's) reactor oversight process.

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 UCS in October 1996 and am the Director of the Nuclear Safety Project. Since nearly its inception in May 1969, UCS has maintained an interest in nuclear powerplant safety. UCS is neither an opponent nor a supporter of nuclear power—our perspective is that of a nuclear safety advocate.

In 2001, the Nuclear Energy Agency, formed in February 1958 as part of the Organization for Economic Co-operation and Development (OECD), released a report titled "Improving Nuclear Regulatory Effectiveness." A task group consisting of representatives of regulatory bodies from around the world, including the NRC, developed this report. A nuclear regulator was defined to be effective when it:

- Ensures that an acceptable level of safety is being maintained by the regulated operating organizations.
- Takes appropriate actions to prevent degradation of safety and to promote safety improvements.
- Performs its regulatory functions in a timely and cost-effective manner as well as in a manner that ensures the confidence of the operating organizations, the general public, and the government.
- Strives for continuous improvements in its performance.

As discussed below, we evaluated the NRC against these four attributes. The bad news is that the NRC does not warrant a passing grade in all of these areas. The good news is that the NRC does score well in some of the areas, providing hope that reforms can be successfully implemented to make the NRC into the effective regulator Americans deserve. The best news is that the needed reforms have already been identified and road-tested and merely need to be applied to the NRC.

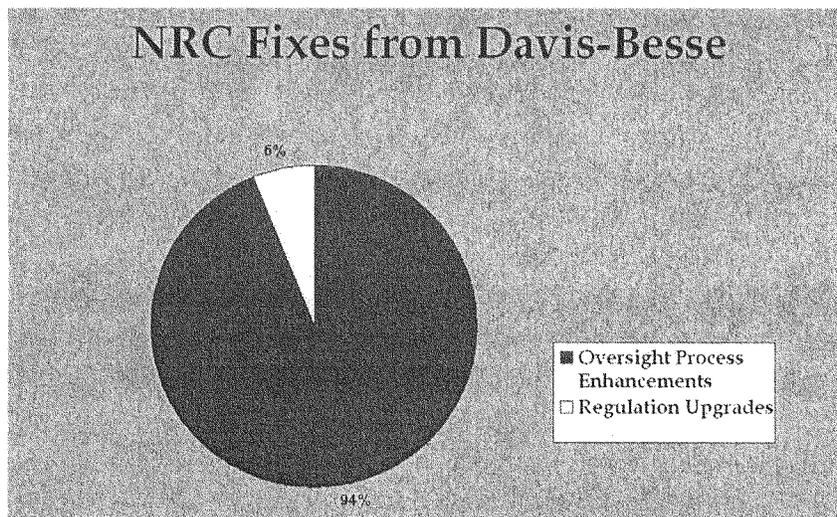
ENSURES THAT AN ACCEPTABLE LEVEL OF SAFETY IS BEING MAINTAINED BY THE REGULATED OPERATING ORGANIZATIONS

To distinguish this criterion from the second one ("takes appropriate actions to prevent degradation of safety"), UCS considered this first criterion to involve establishing appropriate regulations such that the safety bar is set at the proper level.

From the inception of our nuclear safety project in the early 1970s, we have seldom contended that the NRC's regulations were too lax and the safety bar needed to be raised. Thus, we firmly believe the NRC deserves a passing grade, perhaps with honors, for establishing regulations that provide an acceptable level of safety.

Our conclusion is confirmed by assessments made by other evaluators, including the NRC itself. The recommendations by the U.S. Government Accountability Office, the NRC's Inspector General, and other public interest groups rarely involve revising or supplementing existing regulations, implicit concessions that these regulations adequately protect public health (if only they were followed). The quintessential example comes from the NRC's own lessons learned task force probe into the recent debacle at Davis-Besse. This effort produced 49 recommendations on things the NRC should do to prevent another debacle. Only 3 of these 49 recommendations

entailed revisions to or additions to the regulations. The overwhelming majority of the recommendations involved more effective enforcement of the existing regulations.



UCS, without reservations or qualifiers, concludes that NRC has earned a passing grade with respect to establishing regulations that set the safety bar at the proper level.

TAKES APPROPRIATE ACTIONS TO PREVENT DEGRADATION OF SAFETY AND TO PROMOTE SAFETY IMPROVEMENTS

UCS considered this second criterion to entail consistent, effective, and timely enforcement of regulations. Whereas the first criterion sets the safety bar at the proper level, this criterion protects the public from any nuclear reactor doing the limbo beneath the bar.

By any reasonable measure, the NRC deserves a failing grade in this area. Among an abundant stockpile of ineffective regulation examples are:

- Since 1966, there have been fifty-one (51) outages lasting 1 year or longer at U.S. nuclear power reactors to restore safety levels to the proper side of the safety bar. An effective regulator would not be so unaware or unconcerned about nuclear reactor safety levels to let them repeatedly drop as low as to require more than a year to restore them to acceptable levels. These 51 outages—with an estimated price tag of over \$82 billion—are described in our September 2006 report, “Walking a Nuclear Tightrope: Unlearned Lessons of Year-plus Reactor Outages,” available online at <http://www.ucsusa.org/clean-energy/nuclear-safety/unlearned-lessons-from.html>

- From 1986 to 2006, the emergency backup power system at the Fermi Unit 2 reactor in Michigan was tested dozens—perhaps hundreds—of times using the wrong answer key. Workers and NRC inspectors had literally thousands of opportunities over these two decades to catch this error, but all failed to do so. This fiasco is documented in our February 2007 report, “Futility at the Utility: How use of the wrong answer key for safety tests went undetected for 20 years at Fermi Unit 2,” available online at <http://www.ucsusa.org/clean-energy/nuclear-safety/two-decades-of-missed.html>

- From 1996 until 2005, repeated leaks from the discharge line at the Braidwood nuclear plant in Illinois dumped more than 6 million gallons of radioactively contaminated water into the ground, some of which migrated offsite and into the drinking wells of nearby homeowners. Although federal regulations prohibit the unmonitored and uncontrolled release of radioactive air or liquid to the environment, the NRC intentionally opted to ignore those regulations and instead apply regulations governing monitored and controlled releases. In doing so, the NRC verified that Braidwood met the regulation that did not apply to the situation. That’s nice, but irrelevant.

- From around 1999 to 2002, borated water leaked through a cracked nozzle at the Davis-Besse reactor in Ohio causing extensive damage to its reactor vessel lid. Although regulations require a reactor to shut down within 6 hours when such leakage occurs and both the owner and the NRC agreed in early October 2001 that one or more nozzles was leaking, the reactor was allowed to continue operating for roughly 500 times longer than permitted by the safety regulations.

- Beginning in 2002, the NRC conducted more than a dozen targeted inspections at reactors seeking approval for extended power uprates (i.e., more than a 7½ percent increase in the maximum licensed power level). The NRC inspectors never identified a single problem at any reactor. Since 2002, reactors for which the NRC has approved extended power uprates have experienced many uprate-related problems that forced the reactors to shut down or operate at reduced power levels. We do not expect the NRC to have found and prevented all these problems, but they certainly can be faulted for not finding even one among so many serious problems.

- On January 31, 2006, the NRC ordered that emergency sirens for the Indian Point nuclear plant in New York be provided with back-up power supplies by January 30, 2007. On January 23, 2007, the NRC relaxed the order to give the owner until April 15, 2007, to provide the back-up power supplies for the sirens. On April 23, 2007, the NRC proposed a civil penalty of \$130,000 because the April 15th deadline had passed without compliance to the order. The company paid the fine and committed to comply with the order by August 24, 2007. The company did not meet the August 24th date, either. The NRC's regulations permit a civil penalty of \$130,000 to be levied for each day of a continuing violation. Indian Point has been in violation of the NRC's order, as revised, since April 15, 2007, yet the NRC opted to ignore its own regulations and instead apply a one-time fine of merely \$130,000. The NRC is not an aggressive enforcer of regulations, it is a meek and mild enabler of non-conforming behavior.

- During FY 2006, the owners of operating nuclear reactors provided the NRC with the results on 1,854 performance indicators. These performance indicators constitute a large part of the NRC's reactor oversight process for monitoring safety levels. The performance indicators parse safety levels into four color-coded bins: green, white, yellow, and red in order of increasing significance. During FY 2006, 99.4 percent of the performance indicators were green. But the actual safety levels at the reactors did not warrant such green-washing. In the 4th quarter 2006 Action Matrix, 30 of the 103 reactors were identified as requiring heightened NRC attention due to performance problems. The performance indicators have morphed into entirely useless measures that allow genuine safety problems to be undetected until they surface via other means.

- In the current license renewal proceeding involving the Oyster Creek reactor in New Jersey, the intervenor's expert witness calculated that the thickness of the containment's steel liner was less than that allowed by the American Society of Mechanical Engineers (ASME) code, which the NRC formally adopted within its regulations. The NRC reacted to this finding by claiming that complying with the ASME code did not matter because the NRC thought—without providing any supporting documentation—that the thickness was good enough. In doing so, the NRC essentially established a safety bar and finds above the bar and below the bar to be acceptable.

Any one of the above regulatory breakdowns warrants a failing grade on this criterion. The presence of them all, along with many additional examples, explains why the NRC received a failing grade on the next criterion, public confidence.

PERFORMS ITS REGULATORY FUNCTIONS IN A TIMELY AND COST-EFFECTIVE MANNER AS WELL AS IN A MANNER THAT ENSURES THE CONFIDENCE OF THE OPERATING ORGANIZATIONS, THE GENERAL PUBLIC, AND THE GOVERNMENT

There is considerable talk on Capitol Hill and around the country about Independent Safety Assessments (ISAs). UCS considers this talk to reflect lack of confidence in the NRC. After all, if the NRC had the trust and confidence of the public and the government, there would be little interest on the part of the Governors, Public Service Commissions, and public in a special, extraordinary safety inspection at their nuclear reactor.

In addition to this ISA barometer of confidence in NRC, there are plenty of other indicators showing the NRC deserves a failing grade for this criterion. The States of Massachusetts, New Jersey, New York, and Vermont have legally intervened opposing changes at the nuclear reactors in their states that the NRC supports. Again, if these states had confidence that the NRC was an effective regulator adequately protecting the health of their residents, such interventions would not occur. Because this lack of confidence is real, UCS supports bill S.1008 introduced by Senator Ber-

nie Sanders as a means to restore confidence in the NRC as a reliable guardian of public health and safety.

Senator James M. Inhofe, Ranking Member of the committee, spoke directly to the public confidence issue in his July 13, 2007, letter to NRC Chairman Dale E. Klein: “Unfortunately, there has been a considerable lack of communication on the part of the Commission. In particular, I am referring to the leak of high-enriched uranium at the Nuclear Fuel Services plant in Erwin, Tennessee. This event happened prior to your chairmanship, but the communication failure continued well after you assumed the helm. I am both surprised and sorely disappointed.

The foundation of the Commission’s credibility is the public’s trust. That foundation is shaken when events like these are obscured by the Commission’s lack of disclosure. While there may be aspects of Nuclear Fuel Services’ activities that should rightly be withheld from the public domain, clearly the secrecy over the event’s mere occurrence is beyond any reasonable definition of openness.”

Like Senator Inhofe, we were disappointed by the NRC’s behavior in this matter. But there is a silver lining. In a letter dated one week prior to Senator Inhofe’s letter (attachment 1 to this testimony), UCS commended Commissioner Gregory B. Jaczko for his role in causing the Nuclear Fuel Services event to be publicized, albeit belatedly. His efforts reminded us that while the NRC’s document vetting process has to be non-public, it is encouraging that there are dedicated individuals at the NRC guarding against and correcting wrong calls.

#### STRIVE FOR CONTINUOUS IMPROVEMENTS IN ITS PERFORMANCE

If this criterion were “Attains continuous improvements in its performance,” the NRC would get a failing grade. The regulatory shortfalls cited above happen year-in and year-out with little evidence of abatement that would result from continuous improvements in performance.

But this criterion is merely striving for continuous improvements. The NRC has many self-assessment processes and some formal solicitations of external stakeholder comments about its regulatory programs, suggestive of an agency striving for improvement.

But chronic inability to consider these self-assessments and external comments is hardly basis for a passing grade, even when the criterion is merely striving for continuous improvements. Thus, UCS believes the NRC should get a non-passing, non-failing grade.

#### THE REFORMS NEEDED AT NRC

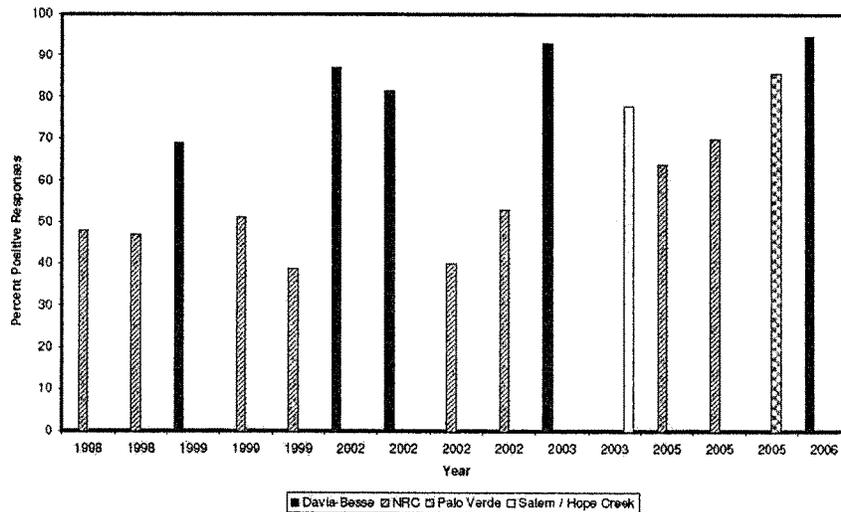
The NRC today is very much like FirstEnergy was when the depths of the problems at Davis-Besse were discovered in 2002, or like Arizona Public Supply System was when the extent of problems at Palo Verde were discovered in 2005, or like Northeast Utilities was when problems at Millstone surfaced in 1996, or like Indiana Michigan Power Company was when problems at D C Cook arose in 1999, or like PSEG was when problems at Salem and Hope Creek were identified in 2004, or like the Tennessee Valley Authority was when problems at Sequoyah and Browns Ferry cropped up in the mid-1980s, or like any one of a dozen other companies were when their shortcomings were detected. The solutions at FirstEnergy, Arizona Public Supply System, Northeast Utilities et al involved two common threads: (1) bringing in senior managers from outside the organization to become the catalysts needed to drive the necessary reforms, and (2) improving the safety culture so the entire work force—management and labor—share the proper focus on safety.

But while the NRC suffers from the same chronic performance malaise, it has never received the same treatment. Thus, while Davis-Besse, Millstone, and others are operating today at higher performance levels than in their problem years, NRC remains at the same level it has been at for the past decades. No better, no worse, no excuse.

For the same reasons it happened at FirstEnergy and elsewhere, the NRC cannot reform until senior managers are brought in from the outside. These new senior managers are not necessarily smarter than those they replace, but they are free of the baggage that in-house managers carry with them. In-house managers are shackled by the inertia of always having done it a certain way. In addition, it is hard for in-house managers to be agents of change because every reform they undertake carries an implicit concession of their past sins. Outside managers are free from these impairments and can more readily implement the necessary reforms. It worked at Davis-Besse, Palo Verde, Millstone, D C Cook, et al. The NRC will never get out of its performance rut without senior managers brought in from the outside to blaze a different path and herd folks along it.

The second remedy involves safety culture improvements. With a good safety culture, workers can identify problems without fear of retaliation and with confidence the problems will be properly fixed in a timely manner. This subcommittee compelled the NRC to do a better job of evaluating safety culture at reactor sites and responding appropriately when problems were indicated. It is now time for the NRC to hold this safety culture mirror up to itself and undertake the same corrective measures. The NRC's safety culture appears worse than that ever measured at Davis-Besse or other plagued sites. In fact, although the Davis-Besse plant was physically ready to restart in the fall of 2003, the NRC determined that its safety culture had not yet sufficiently improved. The NRC did not approve restart of Davis-Besse until March 2004. Ironically, the safety culture at Davis-Besse in the fall of 2003 was substantially better than ever measured at NRC. Likewise, the safety culture measured at Salem and Hope Creek that compelled the NRC to write to the PSEG Chief Executive Officer in January 2004 to compel reforms was better than that measured at NRC. If it's vital that the owner of a single reactor have a good safety culture before restarting that reactor, it's equally vital that the regulator of 104 reactors have a good safety culture.

#### Safety Culture Surveys



**Safety culture surveys record workers' answers to questions like "I can raise safety concerns without fear of retaliation." If all worker answered "yes," the score would be 100. If half of the workers answered "yes," the score would be 50.**

**The 2002 surveys at Davis-Besse were conducted after the near-miss was discovered.**

**The NRC's survey results lagged far behind the surveys at Davis-Besse.**

#### CONCLUSION

The Nuclear Energy Agency defined four attributes of an effective nuclear regulator. The NRC clearly possesses one of those attributes in having established regulations that set the safety bar at the proper height. The NRC just clearly lacks two attributes in failing to effectively enforce its safety regulations which results in a lack of confidence in the agency. The NRC neither passes nor fails the fourth attribute because it has processes seeking continuous improvement in its performance but never realizes any of those sought after gains.

In many ways, the NRC resembles the organizations responsible for serious safety problems at Davis-Besse, Millstone, Salem, Palo Verde, and elsewhere. Those organizational problems were remedied when outside senior managers were brought in to take the necessary reform steps and instill a good safety culture. By not taking these same remedies, the NRC is unable to cure itself of the same disease.

The NRC helped these organizations on the road to reform. The Congress must help the NRC embark upon its own road to reform. Just as true performance turn-arounds resulted from the reforms undertaken at Davis-Besse et al, the NRC can be reformed into an effective regulator. In doing so, Americans will not receive nuclear power at higher cost and lower safety as they have in the past.

On behalf of the Union of Concerned Scientists, I thank you for conducting this hearing and for including our perspective. We look forward to the steps you take to bring about the reforms needed at NRC.

#### AFTERWORD

Although not directly related to the subject of today's hearing—the NRC's reactor oversight process for existing reactors—we want to bring to the Subcommittee's attention two concerns related to the NRC's current plans for new reactors.

First, we are concerned about the NRC's plans to train its staff who will be conducting the safety and environmental reviews for new reactors. UCS attended the April 17, 2007, briefing on new reactors conducted by the NRC Commissioners. We asked about plans for training for all the new staff who would be performing tasks they had never done before or not done in decades. We anticipated the answer would include a role played by the NRC's technical training center outside Chattanooga, Tennessee. We were both surprised and disappointed to receive an answer that was exclusively confined to on-the-job training. We see an important role for on-the-job training. We see it as mortar to fill in the gaps between formal training bricks. The NRC plans a wall of mortar. We hope the Subcommittee will help the NRC abandon this notion and significantly ramp up the formal training provided to staff that will be working on new reactor issues.

Second, we are concerned about the NRC's plans to out-source safety and environmental reviews of new reactor applications to private companies. This would be an outrageous error of judgment on the NRC's part. As Congressman Edward J. Markey stated in his September 24, 2007, letter to NRC Chairman Dale Klein:

"If Congress has intended to allow private companies to regulate private companies in the extraordinarily sensitive nuclear sector, we would not have established the NRC."

During the aforementioned April 17, 2007, Commission briefing on new reactors, the NRC staff informed the Commissioners that they would be out-sourcing the reviews to contractors. But the discussion and very clear implication throughout that briefing (transcript available online at <http://www.nrc.gov/reading-rm/doc-collections/commission/tr/2007/20070417a.pdf>) was that the talented and capable staffs at our national laboratories, like Argonne, Brookhaven, Sandia, and Pacific Northwest Nuclear, would provide the NRC with this supplemental work force. Instead, the NRC wants to farm out safety and environmental reviews for new reactors to private companies. We hope the Subcommittee will get the NRC to halt this unwise step before it is taken.

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#### RESPONSES BY DAVID A. LOCHBAUM TO ADDITIONAL QUESTIONS FROM SENATOR BOXER

*Question 1.* In your testimony, you stated that 99.4 percent of nuclear powerplant performance indicators (PIs) were labeled green in Fiscal Year 2006, but that this large percentage of green indicators was not an accurate reflection of plant performance since 30 reactors were identified as requiring additional NRC attention during fourth quarter of 2006. How do you explain this discrepancy? How can the NRC make PIs more accurate or useful?

Response. When the performance indicators (PIs) were developed prior to the roll-out of the reactor oversight process in April 2000, the threshold for crossing from green to white (e.g., transitioning from expected/desired performance to the first downgraded performance level) was established based on past industry operating experience such that 95 percent of that track record was green and five percent was not. Since the PIs were launched, the NRC has allowed the industry to "game" the PIs such that the PIs are now green almost all of the time, regardless of underlying performance. For example, one of the PIs tracks unplanned power changes. An "unplanned power change" is defined as a power reduction of 20 percent or more that was not planned more than 72 hours in advance. Companies are "gaming" both



The ROP called for Davis-Besse to have at least two full-time NRC resident inspectors. NRC senior managers assigned only one full-time resident inspector for many months and did not compensate with more part-time inspectors from the regional or headquarters offices. The ROP called for Davis-Besse to receive periodic visits from the NRC project manager. Those visits did not happen. The ROP called for Davis-Besse to receive at least a baseline level of NRC inspection hours. The NRC's effort fell far short of that minimum level. Rather than conducting the ROP and letting that effort determine what grade or rating Davis-Besse warranted, the NRC senior managers had some pre-conceived notion as to Davis-Besse's stellar performance and used that false impression to dictate the scope and focus of the effort. That's the subjective, unreliable behavior that ROP was specifically designed to prevent. But ROP can only achieve that objective when NRC's senior managers abide by it. Thus, Davis-Besse is not a poor reflection on the ROP because the NRC wasn't using the ROP at Davis-Besse. They were using their former oversight regime disguised in the new ROP trappings. It hadn't worked before and Davis-Besse demonstrated, again, that it's unworkable.

*Question 1b.* Please explain how you suggest distinguishing between what you consider "baggage" and others consider "experience."

Response. Three case studies illustrate the difference. In 1996 and into 1997, the owner of the Maine Yankee nuclear plant appeared before the NRC Commissioners repeatedly due to recurring safety problems at their facility. David Flanagan, Chairman of the Board, and his senior managers explained to the Commissioners that management at Maine Yankee stayed the course while the rest of the industry set increasingly higher standards and expectations. Over time, this isolation resulted in Maine Yankee's performance falling farther behind industry norms. The solution was to bring in outside managers through Entergy to provide the fixes. A decade later, the owners of the Point Beach nuclear plant in Wisconsin and the owners of the Palo Verde nuclear plant in Arizona replicated both the performance deficiency and the senior management change solution that Maine Yankee experienced. The senior managers at Maine Yankee, Point Beach, and Palo Verde were all accumulating experience, but that experience was similar to the movie "Groundhog Day" in that they were re-living the same thing over and over. The new senior managers brought in to these plants had experience with higher standards and expectations that had been commonly adopted within the industry.

*Question 1c.* In your opinion, how long of a tenure is too long for a senior manager?

Response. UCS is not advocating purging existing senior managers at NRC or capping the tenures of NRC senior managers. These individuals have provided many years of dedicated service and do not deserve to be discarded. Instead, UCS advocates that when senior management positions open up at NRC due to retirements, promotions, and departures from the agency, these opportunities should result in the positions being filled by the best available candidates. Sometimes, the best available candidate will be an NRC employee. But there will also be times when that person exists outside the agency.

*Question 1d.* How long have you been with the Union of Concerned Scientists?

Response. I have been with UCS for over 11 years, since October 1996. However, my tenure is irrelevant to the issue whether it was 1 day or 1 quarter century for the simple reason that I am not a senior, or even junior, manager at UCS. No one reports to me. I have three layers of management between me and the President of UCS. When I came to UCS, Howard Ris was UCS's Executive Director (title later reclassified to President). When Mr. Ris left UCS in 2003, he was replaced as President by Kevin Knobloch. Mr. Knobloch came to UCS in 2000. While a UCS manager with 3 years' in-house tenure might not be considered an "outsider," we can claim full credit for Mr. Knobloch's replacement, Kathy Rest. Ms. Rest came to UCS in 2003 from the outside as our new Executive Director. UCS indeed practices what we preach.

*Question 2.* In advocating the need to replace the NRC's senior managers, you cite examples of plant operators who brought in senior managers from outside the organization, but from other operating companies. Where do you suggest the NRC find qualified, experienced replacements for its senior managers?

Response. Senior managers are primarily leaders who establish appropriate standards and policies and manage resources as needed to ensure these objectives are met. They are not the subject experts performing the technical evaluations and computer analyses. Candidates to replace these NRC senior managers could come from other government agencies with strong histories in nuclear technology, such as the Department of Energy; from national laboratories with extensive nuclear technology experience, such as the Oak Ridge National Laboratory, the Idaho Na-

tional Energy and Environmental Laboratory, from the Argonne National Laboratory; from the many universities who have long maintained nuclear engineering and research programs, such as The University of Tennessee, Oregon State University, and the Massachusetts Institute of Technology; and from private industry. It might be argued that tenure and pension arrangements pose barriers for such candidates, but similar issues have not prevented senior managers from nuclear plant X from departing for more senior management positions at nuclear plant Y. The NRC rightfully boasts of being "a great place to work." If so, it should have little difficulty recruiting top-notch individuals from outside the agency to fill senior manager positions.

Senator CARPER. Mr. Lochbaum, thank you for those comments. We look forward to asking some questions of you.

Mr. Fertel, you are recognized, and then we will recognize Mr. Gaffigan.

**STATEMENT OF MARVIN S. FERTEL, SENIOR VICE PRESIDENT AND CHIEF NUCLEAR OFFICER, NUCLEAR ENERGY INSTITUTE**

Mr. FERTEL. Thank you, Mr. Chairman. On behalf of the nuclear industry, I thank you for the opportunity to testify today.

The NRC Reactor Oversight Program, or the ROP, began in April of 2000. Today the ROP has matured, but it is still evolving, due to a culture of continuous improvement. With the exception of safeguards information that deals with nuclear security matters, every inspection report, every piece of data that supports the performance indicators and every assessment of reactor licensee performance by the NRC is made available on the NRC's public Web site.

Beyond openness and transparency, the other principle that underlies the ROP is objectivity. Risk-informed performance-based approaches are used to ensure that meaningful thresholds of performance are established while maintaining a constant focus on safety. It is the nuclear industry's view that the ROP has been a successful program. Since the ROP was initiated, the safety performance of U.S. nuclear powerplants has improved by every objective indicator of safety performance, while the average capacity factor for the fleet has remained at approximately 90 percent and overall production costs have decreased.

The 2006 GAO report noted three areas for improvement. The industry agrees with the GAO finding that improvements can be made to performance indicators. Since the GAO report, such improvements have already been incorporated into the ROP and other enhancements are currently being pursued.

Consistent with the GAO comments on timeliness, a main concern the industry has with the significance determination process, or the SDP, in the reactor safety area is with the evaluation of findings at the very low to moderate levels or around a 1 in 1 million increase in probability threshold. Routinely, both licensees and the NRC spend inordinate resources assessing these findings. As noted by the GAO report, the NRC has worked on this issue without achieving the same progress as has been achieved in our minds in the area of performance indicators. We hope that at the next oversight hearing, we will be able to report that the issue has been successfully addressed.

The industry believes improvements to the SDP can also be made in the emergency preparedness and public radiation safety cornerstones of the ROP. The SDP for these cornerstones do not rely on the results of probabalistic risk assessments. Rather, the SDPs for

each cornerstone is rule-based, meaning that the process assesses compliance against existing standards to determine the safety significance of the inspection findings.

As a result, the SDP for these areas can result in determinations inconsistent with the actual safety significance of the finding. These determinations can inadvertently overstate the safety, or incorrectly overstate the safety significance of a finding and inadvertently mislead the public. We intend to work with the NRC and other stakeholders to improve the SDP in these cornerstones.

Turning now to the GAO recommendation related to safety culture, as a result of the Davis-Besse reactor vessel head corrosion event, the industry has initiated, through the Institute of Nuclear Power Operations, a major effort to address the issue of safety culture on our side. This effort has included development of a clear set of behaviors expected of a strong safety culture, which are codified in a principles document prepared by INPO. All of the plants conduct critical self-assessments against the expectations. INPO has incorporated safety culture as an explicit area for assessment in its biannual evaluations at every plant site, and the importance of safety culture is reinforced at workshops and training sessions on a regular basis.

In addition, as you heard earlier, the NRC has explicitly incorporated safety culture assessments as part of its review of cross-cutting findings in the ROP process. Because of the potential subjectivity associated with assessing safety culture based on inspection findings, the industry continues to review the process and its outcomes. While the NRC safety culture process is still in its early implementation stage, it appears to be functioning consistently across NRC regions. It appears to have significant NRC management oversight and attention and it appears to be consistent, responsible implementation at this point.

The industry fully agrees with the NRC's conclusion that the current ROP inspection procedure and review standards provide essentially full coverage of key aspects of the Maine Yankee ISA and greater attention to safety culture and potentially risk-significant problems. In addition to the extensive NRC inspection and oversight process, each plant has processes for identifying potential safety and quality issues, determining root causes and assuring accountability through a corrective action program. Also, all plants receive evaluations by INPO at least every 2 years. The extensive industry programs and the new and robust ROP provide significant assessment, transparency and, we believe, timely oversight of NRC licensees.

Turning briefly to new plants, both the NRC and the industry have been working diligently to put in place the regulatory requirements and associated industry guidance documents for licensing them. With a projected 40 percent increase in electricity demand by 2030, clear need for new baseload generation with concerns about climate change, new nuclear plants in the United States are essential to meet our electricity needs and our environmental goals.

Currently there are 17 companies planning on submitting 22 COLs for 31 potential new plants. The industry is committed to standardization within each reactor family and to the submittal of high quality license applications. Companies are accomplishing

these objectives through the use of design centered working groups preparing standardized sections for each license application.

We expect that between 65 to 75 percent of the license application can be standardized, with the remainder including site-specific information. The industry would expect significant reductions in the NRC resources required for subsequent reviews beyond a reference submittal, resulting in decreased licensing fees and significant decreased review schedules.

In this regard, following the completion of the reference plant submittal, the industry expects that the NRC review schedule should be able to be reduced from 42 months to 27 months. We look forward to updating this subcommittee on the progress we are making toward new plant deployment to satisfy our Nation's energy demand and environmental goals.

I appreciate the opportunity to present this and look forward to your questions. Thank you.

[The prepared statement of Mr. Fertel follows:]

STATEMENT OF MARVIN S. FERTEL, SENIOR VICE PRESIDENT AND CHIEF NUCLEAR OFFICER, NUCLEAR ENERGY INSTITUTE

The Nuclear Energy Institute (NEI) is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all utilities licensed to operate commercial nuclear powerplants in the United States, nuclear plants designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

NEI, on behalf of the nuclear energy industry, appreciates the opportunity to provide this testimony for the record in support of congressional oversight of the Nuclear Regulatory Commission.

This testimony will focus on:

- the effectiveness of the NRC's Reactor Oversight Process (ROP) and a few areas where the agency can improve this process
- our agreement with the NRC that the ROP is superior to the one-time experience of conducting an Independent Safety Assessment (ISA)
- the current status of NRC readiness for review of new-plant license applications and industry activities and expectations related to those applications.

INDUSTRY PERSPECTIVE ON THE ROP

The NRC's Reactor Oversight Process (ROP) began in April 2000 and replaced the NRC's Systematic Assessment of Licensee Performance (SALP) program. The NRC developed the ROP with substantial input from the agency's stakeholders, including the nuclear industry and public interest groups. The development effort took over 2 years and resulted in a comprehensive, structured program with recognition that improvements would be made based on implementation experience and stakeholder feedback.

Today, the ROP has matured but is still evolving due to the culture of continuous improvement in the program that has existed at the agency since the ROP's creation. The industry has maintained a ROP Working Group that meets publicly with the NRC on a monthly basis. This effort includes continual review of every aspect of the ROP, including guidance for reporting data to support the performance indicator program, review of methodologies used to support the significance determination process, and comment on inspection procedures that comprise the baseline and supplemental inspection program. The NRC also seeks public comment annually on the ROP and uses this feedback to make improvements to the process.

This continuous dialogue on the implementation of the ROP has resulted in an effective tool for the NRC to oversee its reactor licensees. At the heart of this effectiveness is communication at every level among licensees, the NRC and the public. The ROP is the most open and transparent regulatory process of any regulated industry. With the exception of safeguards information that deals with nuclear security matters, every inspection report, every piece of data that supports the performance indicators, and every assessment of reactor licensee performance by the NRC is made available on the NRC's public Web site.

Beyond openness and transparency, the other principle that underlies the ROP is objectivity. Risk-informed, performance-based approaches are used to ensure that meaningful thresholds of performance are established while maintaining a constant focus on safety. These thresholds direct a graded approach to the allocation of inspection resources, with every plant site receiving baseline inspection of over 2000 hours by NRC personnel each year, and supplemental inspection if licensee performance falls below established thresholds.

In its 2006 report, the GAO concluded that the “NRC’s oversight process is finding safety problems and is getting the industry to constantly improve.”

It is the nuclear industry’s view that the ROP has been a successful program as well as a significant improvement over the previous SALP program. Since the ROP was initiated, the safety performance of U.S. nuclear powerplants has improved by every objective indicator of safety performance, while the average capacity factor for the fleet has remained at approximately 90 percent and overall production costs have decreased. This has been a “win-win-win” for safety, productivity and efficiency.

#### AREAS FOR IMPROVEMENT

The industry has worked with the NRC to institute a number of improvements to the ROP since its inception. These include significant enhancements to some of the performance indicators as well as the incorporation of the safety culture initiative into the inspection process.

The 2006 GAO report also noted three areas for improvement: the first two related to “. . . the timeliness of the process used to determine the risk significance of inspection findings and the ability of performance indicators to contribute to the early identification of poorly performing plants.” The third area identified by GAO related to the assessment of safety culture as part of the ROP.

The industry agrees with the GAO finding that improvements can be made to performance indicators, and since the GAO report such improvements have already been incorporated into the ROP, (e.g., mitigating system performance indicator) and other enhancements are currently being assessed by the NRC and external stakeholders. More progress is needed to improve the significance determination process (SDP), the process used to determine the risk significance of inspection findings. The SDP evaluates inspections findings for their safety significance and assigns a corresponding color: green for a finding of very low significance, white for low to moderate significance, yellow for substantial significance, and red for high safety significance.

In the reactor safety area of the ROP, quantitative analysis using probabilistic risk assessment tools is used to assign safety significance to an inspection finding. In numerical terms, the green/white threshold is a one-in-one-million increase in the probability of a core damage event from a particular finding, the white/yellow threshold is a factor of ten higher at one-in-one-hundred-thousand increase, and the yellow/red threshold at one-in-ten-thousand increase in the probability of a core damage event.

Consistent with the GAO comment on timeliness, the main concern the industry has with the SDP in the reactor safety area is with the evaluation of findings at the very low to moderate levels, or around the green/white threshold (one-in-one million increase in probability). This level is so low that it is within the uncertainty bands of the probabilistic risk assessment tools used by licensees and the NRC. Routinely, both licensees and the NRC spend inordinate resources on these *de minimus* risk evaluations because the outcome of the evaluation can change the NRC’s oversight of a licensee within the ROP as well as the perception of the licensee’s performance to other stakeholders. As noted by the GAO report, the NRC has worked on this issue without achieving the same progress as has been achieved in the area of performance indicators. We hope that at the next oversight hearing we will be able to report that the issue has been successfully addressed.

Before addressing the GAO concern about safety culture, another area where industry believes improvements to the SDP can be made are in the emergency preparedness and public radiation safety cornerstones of the ROP. The SDP for these cornerstones do not rely on the results of probabilistic risk assessment. Rather, the SDP for each cornerstone is rule-based, meaning that the process assesses compliance against existing standards to determine the safety significance of the inspection finding. The industry’s concern is that the SDP for these areas can result in determinations inconsistent with the actual safety significance of the finding. These determinations can incorrectly overstate the safety significance of a finding and inadvertently mislead the public.

Two examples illustrate this concern. The first is in the radiation protection area. The industry agrees with the NRC and other stakeholders that it is unacceptable to have inadvertent spills or releases of tritium from our plants, and we have taken affirmative actions across the entire industry to assure appropriate monitoring for such situations and the prompt reporting of them if they occur. While these actions are both necessary and appropriate to ensure credibility and maintain public confidence, rarely do such events constitute an actual increase in risk to the public.

Using the SDP for the public radiation protection area, the NRC issued a white finding to a licensee for failure to assess an inadvertent release when it occurred. Subsequent assessment demonstrated that this release was of very low significance. Thus, the white finding incorrectly communicated to the public the safety significance of this release. While it may be appropriate for NRC to take some form of regulatory action for this type of occurrence, labeling this finding as having low to moderate safety significance in ROP space is misleading. We intend to work with the NRC and other stakeholders to improve the SDP in this cornerstone.

The second example deals with the emergency planning area. In this case, during a drill, the licensee must classify an event within 15 minutes with the information available at the time. The licensee, per procedures and training, conservatively classified the event for the scenario being exercised. The NRC issued a finding for the subsequent licensee critique of the drill, stating that a less conservative classification was more appropriate for this scenario, and that the licensee's critique should have identified this shortcoming. Using the SDP as the emergency planning cornerstone of the ROP, the NRC concluded this was a white finding. Again, the industry believes that a white finding in this case incorrectly communicated to the public the safety significance of a finding related to a "critique" following a drill.

In summary, to maintain the credibility of the ROP with all stakeholders, the SDP must be objective, risk-informed, and accurately communicate the significance of inspection findings to the public, and we hope to report progress in this area to this Committee at your next oversight hearing.

With regard to the GAO recommendations related to safety culture, as a result of the Davis-Besse reactor vessel head corrosion event, the industry has initiated through the Institute of Nuclear Power Operations (INPO) a major effort to address the issue of safety culture.

This effort has included the development of a clear set of behaviors expected of a strong safety culture which are codified in a principles document prepared by INPO. All of the plants have conducted critical self-assessments against the expectations.

INPO has incorporated safety culture as an explicit area for assessment in its bi-annual evaluations at every plant site and the importance of safety culture is reinforced at workshops and training sessions on a regular basis. In addition, the NRC has explicitly incorporated safety culture assessments as part of its review of cross-cutting findings in the ROP process. Because of the potential subjectivity associated with assessing safety culture based upon inspection findings, the industry continues to review the process and its outcomes.

While the NRC safety culture process is still in its early implementation stage, it appears to be functioning consistently across NRC regions. It appears to have significant NRC management oversight to ensure consistent and responsible implementation. The GAO recommended that NRC consider looking at specific performance indicators to identify safety culture issues. We have not found any specific performance indicator that provides such insights.

#### THE ROP AND INDEPENDENT SAFETY ASSESSMENTS

We note that two senators have introduced legislation calling for independent safety assessments (ISA) of nuclear powerplants. We also note that the NRC has on its Web page a comprehensive comparative review of the ROP against the ISA that was conducted at Maine Yankee in 1996. The industry fully agrees with the NRC's conclusion that the current ROP inspection procedures and NRC review standards provide essentially full coverage of key aspects of the Maine Yankee ISA, and greater attention to safety culture and potentially risk-significant problems.

A great deal of mythology has been created around the Maine Yankee ISA and the owners' decision to decommission the plant. The ISA was not the cause of this decision as few significant issues were uncovered, and the cost to address those issues was in the tens of millions of dollars. There were many other factors that contributed to the decision including the need for steam generator replacement (hundreds of millions of dollars), the uncertainty regarding license renewal (no plant had yet received a renewed license at that time) and the lack of strong public support for the continued operation of the plant (several public referendums in Maine

in the 1990s on continued operation narrowly passed). All of these items contributed more to the decision to shut the plant down than the ISA.

In addition to the extensive NRC inspection and oversight processes, each plant has processes for identifying potential safety or quality issues, determining root-causes and ensuring accountability through corrective action programs. Also, all plants receive evaluations by INPO at least every 2 years. INPO was formed in 1980 by the nuclear industry to promote excellence in all aspects of nuclear safety in plant operations. INPO evaluations utilize peers from other operating companies as well as INPO subject matter experts. These evaluations are discussed with the senior management personnel of each operating company and each company holds each other accountable for performance through the INPO process. The extensive industry programs and the new and robust ROP provide significant assessment, transparency and timely oversight of NRC licensees.

#### NEW NUCLEAR POWERPLANTS

Both the NRC and the industry have been working diligently to put in place the regulatory requirements and associated industry guidance documents for licensing new plants. With a projected 40 percent increase in electricity demand by 2030, a clear need for new baseload generation and with concerns about climate change, new nuclear plants in the United States are essential to meet our electricity needs and environmental goals. In this regard, just last week the first full combined operating license (COL) was filed with the NRC. Currently, there are 17 companies planning on submitting 22 COLs for 31 potential new nuclear plants.

The final NRC rule (10 CFR Part 52) on new nuclear plant licensing was issued last month and more than 250 regulatory guides and standard review plans have been issued for public comment. The NRC has also established a New Reactor Organization (NRO) and has placed experienced management personnel in this group and has been aggressively hiring staff to support the new organization. Also, NRC has installed a new project controls system for managing activities related to new plant licensing. All of these actions by NRC should contribute positively to the review of the license applications they receive.

The GAO has just completed a review of the NRC's preparedness to receive and review new plant license applications and in general is complimentary of the NRC's actions.

The industry is committed to standardization within each reactor family and to the submittal of high-quality license applications. Companies are accomplishing these objectives through the use of design-centered working groups preparing standardized sections for each license application. We expect that between 65-75 percent of a license application can be standardized, with the remainder including site specific information. Given the degree of standardization, the industry would expect significant reductions in NRC resources required for subsequent reviews, beyond the reference submittal, resulting in decreased licensing fees, and significantly decreased review schedules. In this regard, following the completion of the reference plant submittals, the industry expects that the NRC review schedule should be able to be reduced from 42 months to 27 months. The industry recognizes that for the first wave of submittals, if filed almost concurrently, the schedule savings would be less. We are committed to working with the NRC on achieving the maximum efficiencies possible, without decreasing either the quality of the review, or its transparency. We look forward to updating the subcommittee on the progress we are making towards new plant deployment to satisfy our nation's energy demand and environmental goals.

Finally, we note that this subcommittee's oversight of the NRC has led to several changes at the agency, including the advent of the ROP itself and incorporation of the safety culture initiative into the ROP. Public confidence is a key factor in the resurgence of nuclear power as a means to address this country's energy and environmental goals. The NRC's role as a strong, credible and independent federal regulator is a fundamental component of this public confidence. The industry urges the subcommittee to exercise its oversight responsibility rigorously to ensure the agency is effective in carrying out its mission, and, when required, to pass authorizing legislation necessary for that to occur.

NEI appreciates the opportunity to address the subcommittee.

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#### RESPONSES BY MARVIN FERTEL TO ADDITIONAL QUESTIONS FROM SENATOR BOXER

*Question 1.* In your written testimony you indicated that more work is needed to improve the process that the NRC uses to determine the significance or risk of each inspection finding. Approximately ninety-seven percent of inspection findings be-

tween 2001 and 2005 were labeled green (very low significance), and less than one percent were yellow (substantial significance) or red (high significance). Given that only one percent of the findings were labeled as being of substantial or high significance, what problem could the industry have with the NRC's labeling of inspection findings?

Response. The three guiding objectives used to develop the revised Reactor Oversight Process are as applicable today as they were in 1999.

- Risk-inform the processes so that NRC and licensee resources are focused on those aspects of performance having the greatest impact on safe plant operation.
- Improve the objectivity of the oversight processes so that subjective decisions and judgment [are] not central process features.
- Improve the scrutability of these processes so that NRC actions have a clear tie to licensee performance.

We have no problem when the labeling, be it green, white, yellow or red, is appropriate for the facts. Any mislabeling of a finding undermines these ROP objectives. As noted in my testimony, there are areas of the ROP (e.g., significance determinations) where a large amount of subjectivity remains. This results in both licensees and NRC spending inordinate resources on de minimus risk evaluations. The outcomes of these evaluations are important as they impact the NRC's oversight of a licensee within the ROP as well as the perception of the licensee's performance by other stakeholders. While full elimination of subjective judgment is probably impossible to achieve, it remains an important objective and is a crucial part of the guiding objective to clearly tie NRC actions to licensee performance.

*Question 2.* Performance indicators (PIs) were 99.4 percent green in Fiscal Year 2006, despite problems which required additional oversight at 30 plants that year. Given the disparity between PIs ratings and the need for additional oversight, how can the industry believe that PIs provide an accurate reflection of plant performance? Would PIs be more accurate if reporting them was mandatory?

Response. The value of 30 cited in the question is incorrect. During Fiscal Year 2006 (October 2005 through September 2006) there were 17 plants that received additional oversight due to non-green performance indicators.

Each of the 103 plants operating in Fiscal Year 2006 reported the status of 19 performance indicators on a quarterly basis. Any non-green performance indicator for a plant results in additional oversight activity. This occurs even though 18 of the 19 performance indicators are green (i.e., 95 percent green).

While reporting of performance indicators is a voluntary industry action, the NRC inspects each plant's performance indicator data on an annual basis to determine its accuracy and completeness.

*Question 3.* In your written testimony you state that inadvertent spills or releases of tritium from nuclear plants rarely pose a public safety concern. How can you determine that tritium releases are rarely a public hazard if the information on these releases is not required to be reported? At what level would you consider a tritium release to be hazardous? Should all releases of tritium at nuclear powerplants be made public?

Response. NRC regulations require each nuclear powerplant operator to submit to NRC an annual report detailing the amount of radioactive material released to the environment during the past year. This report estimates the public health impact of the releases. Nuclear powerplant operators also monitor the environment in the vicinity of their plants, per regulation, to assess the cumulative impact of the radioactive material that has been released. The results of the environmental monitoring program are submitted to the NRC on an annual basis. Both of these reports for all commercial nuclear powerplants are available to the public via the NRC Web site.

The U.S. EPA has established a maximum contaminant level for Tritium of 20,000 pCi/L. This standard is conservatively set based on EPA's public discussions related to the standard.

Additionally NEI has established the Groundwater Protection Initiative during 2006 and supplemented the initiative with a Final Guidance Document issued on August 31, 2007. The initiative is not a regulatory required program but is binding on the utility members of the Nuclear Energy Institute which includes all power reactor licensees. Leaks and spills that exceed 100 gallons that reach soil and have detectable radioactivity are to be disclosed to State and local government as well as disclosure to the NRC. Monitoring results supporting the Groundwater Protection Initiative are to be included in the Annual Radiological Environmental Operating Report or the Annual Radioactive Effluent Release Report.

*Question 4.* Your written testimony called on the Subcommittee on Clean Air and Nuclear Safety to conduct active oversight of the NRC in an effort to maintain and improve public confidence in the NRC. Are there any specific areas in which you believe the Subcommittee should conduct additional oversight?

Response. The Reactor Oversight Process is not, nor should it be, a static process. It is important that NRC, industry and other stakeholders continue their efforts to improve the overall effectiveness, predictability, consistency, transparency and objectivity of the ROP. These efforts should continue to be focused on areas where needed improvements are identified and to ensure that the ROP continues to adhere to the principles upon which it was founded. The subcommittee's efforts to promote these improvement efforts both in the past and continuing in the future are appreciated.

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RESPONSES BY MARVIN FERTEL TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

*Question 1.* In his testimony, Mr. Lochbaum refers to 51 outages that lasted longer than 1 year. How many of those outages have occurred since the ROP was put in place?

Response. There has been only one extended outage since implementation of the revised ROP in 2000. An extended outage at the Davis-Besse plant began in February 2002.

*Question 2.* Over 99 percent of the Reactor Oversight Process Performance Indicators are green. Do the performance indicators serve the purpose of identifying declining plant performance?

Response. The Reactor Oversight Process performance indicators continue to serve as important indicators of plant performance. The industry has continued a noted trend of improved performance in the years prior to and since ROP inception. The high percentage of green performance indicators reflects this industry-wide performance trend. The effectiveness of performance indicators as a means to identify decreases in performance by individual plants is independent of the overall performance of the industry. More so than the previous oversight process (NRC's Systematic Assessment of Licensee Performance), the ROP does provide close to real time transparency on individual plant performance, and as evident by the few examples of declining plant performance, it does serve as a good input to NRC decision-making.

*Question 3.* In your testimony, you indicate that the review schedule for new plant licenses could be decreased from 42 months to 27 months, because of standardized applications. What is the basis for this estimate?

Response. This reduction in schedule is predicated on the design centered approach to both the development and review of combined license (COL) applications. The NRC has just started the reviews of the first COL applications and is in the process of preparing detailed review schedules. The NRC has planned on a schedule of 30 months for its review and 12 months for a hearing, yielding a 42 month schedule. However, we also expect that for the next COL referencing the same certified design, the NRC review schedule should decrease since up to 75 percent of that COL will be identical to the first. Only site specific differences in the design, along with the environmental review for the particular site, will be different. In these cases, we believe the NRC review schedule should be about 15 months rather than 30 months, which if coupled with a 12 month hearing schedule yields 27 months. If the applications are not standardized to the extent practical as described above, we do not expect to see decreases in the schedule review time.

Senator CARPER. Mr. Fertel, thank you. Right on the money, 5 minutes.

Mr. Gaffigan, welcome. We are delighted that you are here.

**STATEMENT OF MARK GAFFIGAN, ACTING DIRECTOR, NATURAL RESOURCES AND ENVIRONMENT, U.S. GOVERNMENT ACCOUNTABILITY OFFICE**

Mr. GAFFIGAN. Thank you, Mr. Chairman, and good afternoon.

I am pleased to be here to discuss NRC's reactor oversight process, or the ROP. Through the ROP, NRC oversees the operation of the Nation's 104 commercial nuclear power reactors to ensure their safe operation. The safety of these reactors is important, not only

to public health and the environment, but to maintaining public confidence in nuclear power, the source of about 20 percent of the Nation's electricity.

In September 2006, GAO issued a report on the ROP that reviewed three issues: No. 1, how does NRC implement the ROP? No. 2, what have been the results of the ROP? and No. 3, what efforts has NRC undertaken to improve the ROP? My opening remarks address these three issues.

First, in implementing the ROP, NRC uses a variety of tools and takes a risk-informed and graded approach to ensuring safety. What does this mean? This means that the level of oversight is designed to be commensurate with the performance of the plant and the safety significance of plant equipment and operations. Key ROP tools include physical inspections of plant equipment and operations, as well as performance indicators such as the reliability of alert and notification systems.

NRC's graded approach involves using these tools to determine the appropriate levels of oversight. For example, when inspections identify a problem, NRC assesses the finding's safety significance and assigns it one of four colors to represent increasing levels of risk, from green, that equates to very low risk, to white, yellow and red, to reflect increasing levels of risk. All plants are subject to a baseline level of inspection. But plants with greater than green findings face increasing levels of supplemental inspections.

Second, regarding the results of the ROP, between 2001 and June of this year, the ROP has identified more than 5,200 inspection findings. The vast majority of these findings, about 98 percent, were designated green, very low risk, to safe facility operations but important to correct. Of the remaining findings, 113 were white, reflecting low to moderate risk, and 13 findings were of the highest levels of risk significance, 8 yellow and 5 red.

Based on these inspection findings and other tools, NRC has conducted oversight beyond baseline inspections at more than 75 percent of reactor units. While most reactors received the lowest level of increased oversight, five operating reactors received NRC's highest level of oversight at some time between 2001 and 2005. This would be the column four that was referred to earlier.

Currently, 1 reactor is receiving NRC's highest level of oversight, and 10 reactors at 6 facilities are receiving the second highest level of oversight.

Finally, regarding ROP improvement efforts, NRC has made improvements to its oversight process. But more refinements are needed. Key improvements include reducing the time it takes to determine the significance of inspection findings. Further refinements that we recommended included that NRC increase its efforts to assess safety culture, the organizational characteristics that ensure that safety issues receive proper attention.

We also recommended that NRC develop performance indicators to measure aspects of safety culture. NRC has taken some actions to implement these recommendations and plans to consider further refinements. We believe NRC needs to continue to give this issue attention so it could continue to improve the ROP.

In summary, while we last reported on NRC's reactor oversight process in 2006, I am hopeful that any current or future review

would find that NRC has improved its oversight. I am also confident that any such review would identify further room for improvement. This is because effective nuclear reactor oversight is an ongoing and dynamic process that calls for constant vigilance and continuous improvement. This is especially true as our nuclear infrastructure continues to age and more is learned with our experience.

In the future, NRC will face added demands in meeting its oversight mission as it begins to oversee the licensing, construction and operation of 31 new reactor units currently planned. GAO has just issued a September 2007 report to you on the challenges NRC faces in its new reactor activities.

I have submitted a written statement to you on both NRC's reactor oversight process and its new reactor activities. This concludes my opening remarks and I welcome any questions you might have. Thank you.

[The prepared statement of Mr. Gaffigan follows:]

STATEMENT OF MARK GAFFIGAN, ACTING DIRECTOR NATURAL RESOURCES AND ENVIRONMENT, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss the adequacy of the Nuclear Regulatory Commission's (NRC) Reactor Oversight Process (ROP) to ensure public health and safety. Through the ROP, NRC oversees the operation of the nation's 104 commercial nuclear power reactors, which provide about 20 percent of the nation's electricity. The safety of these reactors, which are located at 65 facilities in 31 states, has always been important because an accident could result in the release of radioactive material with potentially serious adverse effects on public health and the environment. NRC is responsible for inspecting operating nuclear power facilities, while facility operators are responsible for safely operating their facilities. NRC has the authority to take actions, up to and including shutting down a reactor, if conditions are not being met and the reactor poses an undue risk to public health and safety.

NRC is also responsible for licensing the construction and operation of new reactors. Since 1989, NRC has worked to develop a regulatory framework and review process for licensing new reactors that allow an electric power company to obtain a construction permit and an operating license through a single combined license (COL) based on one of a number of standard reactor designs. The COL is NRC's response to the nuclear industry's concerns about the length and complexity of NRC's former two-step process of issuing a construction permit followed by an operating license. NRC has been working to complete this process because electric power companies have announced plans to submit 20 applications in the next 18 months for licenses to build and operate 31 new reactor units—nearly three decades after the last order was placed for a new civilian nuclear power reactor unit in the United States.

As requested, my remarks today will focus on our September 2006 report, which examined how NRC implements the ROP to oversee reactor operations safety, the results of the ROP over the past several years, and the status of NRC's efforts to improve the ROP from 2001 through 2005.<sup>1</sup> In addition, on September 21, 2007, we issued a report to you on the steps NRC has taken to prepare its workforce and manage its workload for new reactor licensing and to develop its regulatory framework and key review processes for new reactor activities.<sup>2</sup>

To examine NRC's oversight of operating reactors through the ROP, we assessed NRC's policies and guidance documents, examined inspection manuals and findings reports, and reviewed the level of oversight it provided as a result of its findings. We analyzed NRC data on nuclear reactor safety for 2001 through 2005, including an assessment of their reliability, which we determined were sufficiently reliable for

<sup>1</sup>GAO, *Nuclear Regulatory Commission: Oversight of Nuclear Powerplant Safety Has Improved, but Refinements Are Needed*, GAO-06-1029 (Washington, D.C.: Sept. 27, 2006).

<sup>2</sup>GAO, *Nuclear Energy: NRC's Workforce and Processes for New Reactor Licensing Are Generally in Place, but Uncertainties Remain as Industry Begins to Submit Applications*, GAO-07-1129 (Washington, D.C.: Sept. 21, 2007).

the purposes of our report. We also analyzed NRC's annual self-assessment reports and relevant inspection documents, reviewed external evaluations of the ROP, and interviewed several NRC managers and external stakeholders. Physical security, which is also covered by the ROP, was not included in this review. In addition, to examine NRC's readiness to evaluate new reactor license applications, we reviewed NRC documents for new reactor workforce staffing and training, examined NRC's regulations and guidance, and interviewed managers in NRC's Office of New Reactors and several other offices with responsibilities related to new reactor efforts. Furthermore, we interviewed nearly all of the announced applicants to obtain their views on the efficiency and usefulness of NRC's application review process and observed several of NRC's public meetings on the new reactor licensing process. Our ROP work was conducted from July 2005 through July 2006, and our new reactor licensing work from January 2007 through September 2007, in accordance with generally accepted government auditing standards.

#### BACKGROUND

NRC's Office of Nuclear Reactor Regulation provides overall direction for the oversight process and the Office of Enforcement is responsible for ensuring that appropriate enforcement actions are taken when performance issues are identified. NRC's regional offices are responsible for implementing the ROP, along with the inspectors who work directly at each of the nuclear power facilities. NRC relies on on-site resident inspectors to assess 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 operations. NRC noted that nuclear power facilities' improved operating experience over more than 25 years allows it to focus its inspections more on safety significant activities.

One key ROP goal is to make safety performance assessments 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 facility in Ohio led NRC to re-examine its safety oversight and other regulatory processes to determine how such corrosion could be missed.<sup>3</sup> Based on the lessons learned from that 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.

In anticipation of licensing new reactors, NRC has accelerated its efforts to build up its new reactor workforce. NRC's workforce has grown from about 3,100 employees in 2004 to about 3,500 employees as of August 2007, and NRC projects that its total workforce size needs will grow to about 4,000 employees by 2010.

NRC estimates that the first few COL applications will require about 100,000 hours of staff review and identified around 2,500 associated review activities related to each application's detailed safety, environmental, operational, security, and financial information, which may total several thousand pages. NRC anticipates that for each application, the review process will take 42 months—including 30 months for its staff review, followed by approximately 12 months for a public hearing.<sup>4</sup> In addition to the COL, NRC has established (1) the design certification, which standardizes the design of a given reactor for all power companies using it, with modifications limited to site-specific needs, and (2) an early site permit, which allows a potential applicant to resolve many preliminary siting issues before filing a COL application.<sup>5</sup> Electric power companies plan to use five different reactor designs in their COL applications.

<sup>3</sup>GAO, *Nuclear Regulation: NRC Needs to More Aggressively and Comprehensively Resolve Issues Related to the Davis-Besse Nuclear Powerplant's Shutdown*, GAO-04-415 (Washington, D.C.: May 17, 2004).

<sup>4</sup>While the evidentiary hearing occurs after NRC staff complete their review of an application, such prehearing activities as decisions on standing, contention admissibility, and procedural motions begin when the application is docketed.

<sup>5</sup>NRC also plans to issue new regulations providing limited work authorizations that would address the construction activities companies can conduct with NRC authorization and oversight. Such activities as site clearing, excavation, road building, transmission line routing, and erecting construction-related support buildings or service facilities do not require NRC authorization.

NRC USES VARIOUS TOOLS AND TAKES A RISK-INFORMED AND GRADED APPROACH TO  
ENSURING THE SAFETY OF NUCLEAR POWER FACILITIES

In implementing its ROP, NRC oversees the safe operation of nuclear power facilities through physical inspections of the various complex plant equipment and operations, reviews of reactor operator records, and quantitative measures or indicators of each reactor's performance. (See table 1 for a more expansive treatment of these tools.) These tools are risk-informed in that they focus on the aspects of operations considered most important to safety. NRC bases its oversight process on the principle and requirement that licensees have programs in place to routinely identify and address performance issues without NRC's direct involvement. Thus, an important aspect of NRC's inspection process is ensuring the effectiveness of licensee programs designed to identify and correct problems. On the basis of the number and risk significance of inspection findings and performance indicators, NRC places each reactor unit into one of five performance categories on its action matrix, which corresponds to graded, or increasing, levels of oversight. NRC assesses overall facility performance and communicates the results to licensees and the public on a semi-annual basis.

*TABLE 1: THE ROP'S MULTIPLE TOOLS AND GRADED APPROACH*

ROP Tool	Description
Baseline inspections .....	NRC collects information about reactor units' performance from baseline inspections by NRC inspectors and quantitative measures reported by the licensees. These physical inspections are the main tool NRC uses to oversee safety performance of facilities. NRC defined specific inspection areas by developing a list of those elements most critical to meeting the overall agency mission of ensuring safety at nuclear power facilities.
Significance determination process .....	When NRC inspectors identify a finding they consider to be more than minor, <sup>1</sup> they use a significance determination process to assign one of four colors—green, white, yellow, or red—to reflect the finding's risk significance, which is set on the basis of measures that reflect the potential health effects that could occur from radiological exposure. The significance determination process assesses how an identified inspection finding increases the risk that a nuclear accident could occur, or how the finding affects the ability of the facility's safety systems or personnel to prevent such an accident. For some findings, this process is more deterministic in nature rather than being tied to risk, such as for emergency preparedness or radiation protection. In these areas, NRC defines a response appropriate for the given performance problem.
Supplemental inspections .....	When NRC issues one or more greater-than-green inspection findings for a reactor unit or facility, it conducts supplemental inspections. <sup>2</sup> There are three levels of supplemental inspections performed by regional inspectors that expand the scope beyond baseline inspection procedures and focus on diagnosing the cause of the performance deficiency: <ul style="list-style-type: none"> <li>• the lowest level assesses the licensee's corrective actions to ensure they were sufficient in both correcting the problem and identifying and addressing the root and contributing causes to prevent recurrence.</li> <li>• the second level has an increased scope that includes independently assessing the extent of the condition for both the specific and any broader performance problems.</li> <li>• the highest level is yet more comprehensive and includes determining whether the reactor unit or facility can continue to operate and whether additional regulatory actions are needed. This level is usually conducted by a multidisciplinary team of NRC inspectors and may take place over several months.</li> </ul>

TABLE 1: THE ROP'S MULTIPLE TOOLS AND GRADED APPROACH—  
CONTINUED

ROP Tool	Description
Cross-cutting aspects or issues .....	As part of its inspection process, NRC evaluates all of its findings to determine if certain elements of reactor facility performance, referred to as cross-cutting aspects, were a contributing cause to the performance problem. There are three cross-cutting aspect areas: (1) problem identification and resolution, (2) human performance, and (3) a safety-conscious work environment. If more than three findings have similar causes within the same cross-cutting area and if NRC is concerned about the licensee's progress in addressing these issues, it determines that the licensee has a "substantive" cross-cutting issue. NRC notifies the licensee that it has opened a substantive cross-cutting issue, and it may ask the licensee to respond with the corrective actions it plans to take.
Special inspections .....	NRC conducts special inspections of reactors when specific events occur that are of particular interest to NRC because of their potential safety significance or potential generic safety concerns important to all reactor units or facilities. Special inspections determine the cause of the event and assess the licensee's response to the event. For special inspections, a team of experts is often formed and an inspection charter issued that describes the scope of the inspection efforts.
Performance indicators .....	In addition to its various inspections, NRC also collects information through its performance indicator program, which it maintains in cooperation with the nuclear power industry. On a quarterly basis, each facility voluntarily self-reports data for 16 separate performance indicators—quantitative measures of performance related to safety in the different aspects of operations. <sup>3</sup> NRC inspectors review and verify the data submitted for each performance indicator annually through their baseline inspections. Similar to its process for conducting supplemental inspections, when colors indicating the risk level are assigned and when greater-than-green indicators are identified, NRC conducts supplemental inspections in response. A green performance indicator reflects performance within the acceptable range, unlike inspection findings for which green indicates a performance deficiency.
Action matrix .....	NRC uses its action matrix to categorize reactor unit or facility performance and apply increased oversight in a graded fashion. On a quarterly basis, NRC places each nuclear power reactor unit into one of five performance categories on its action matrix, which corresponds to graded, or increasing, levels of oversight. The action matrix is NRC's formal method of determining how much additional oversight—mostly in the form of supplemental inspections and NRC senior management attention—is required on the basis of the number and risk significance of inspection findings and performance indicators.
Assessment letters and public meetings	At the end of each 6-month period, NRC issues an assessment letter to each nuclear power facility. This letter describes what level of oversight the facility will receive according to its placement in the action matrix performance categories, what actions NRC is expecting the licensee to take as a result of the performance issues identified, the inspection schedule for the next 15 months, and any documented substantive cross-cutting issues. NRC also holds an annual public meeting at or near each facility's site to review performance and address questions about the facility's performance from members of the public and other interested stakeholders.
Industry trends .....	Annually, NRC assesses the results of its oversight process on an industry-level basis by analyzing the overall results of its inspection and performance indicator programs and comparing them with other industry-collected and reported performance data.

Source: GAO analysis of NRC documents.  
 Note: NRC conducts an annual self-assessment of the ROP, which includes soliciting input from internal and external stakeholders on its effectiveness.  
<sup>1</sup>NRC defines "minor issues" as those that have little actual safety consequences, little or no potential to impact safety, little impact on the regulatory process, and no willfulness.  
<sup>2</sup>Supplemental inspections are also conducted for greater-than-green performance indicators.  
<sup>3</sup>There also are three physical security performance indicators that were outside the scope of this review.

THE ROP HAS IDENTIFIED NUMEROUS PROBLEMS AT NUCLEAR POWER FACILITIES, BUT FEW HAVE BEEN CONSIDERED SIGNIFICANT TO THEIR SAFE OPERATION

From 2001 through 2005, the ROP identified performance deficiencies through more than 4,000 inspection findings at nuclear power facilities. Ninety-seven percent of these findings were designated green—very low risk to safe facility operations, but important to correct. Two percent (86) were white findings that were considered to be of low to moderate risk significance. Twelve findings were of the highest levels of risk significance—7 yellow and 5 red. More recently, from January 2006 through June 2007, NRC identified an additional 1,174 green findings, 27 white findings, 1 yellow finding, and no red findings.

NRC also reviews performance indicators data—used to monitor different aspects of operational safety—that facility operators report to categorize the level of reactor unit performance for each indicator. From 2001 through June 2007, NRC reported that less than 1 percent of over 39,000 indicator reports exceeded acceptable performance thresholds and nearly half of all reactor units have never had a performance indicator fall outside of the acceptable level. Through June 2007, 3 of the 16 performance indicators have always been reported to be within acceptable performance levels—measuring the amount of time that the residual heat removal safety system is unavailable, monitoring the integrity of a radiation barrier, and monitoring radiological releases. Since 2001, three reactor units have reported a yellow indicator for one performance indicator. No red indicators have ever been reported.

For varying periods from 2001 through 2005, on the combined basis of inspection findings and performance indicators, NRC has subjected more than 75 percent of the reactor units to oversight beyond the baseline inspections. While most reactors received the lowest level of increased oversight through a supplemental inspection, five reactors were subjected to NRC's highest level of oversight. Reactor units in this category were generally subjected to this higher oversight for long periods due to the more systemic nature of their performance problems. Currently, 1 unit is receiving the highest level of oversight by NRC, and 10 units at 6 facilities are receiving the second level of oversight.

NRC inspectors at the facilities we reviewed indicated that when a reactor unit's performance declines it is often the result of deficiencies or ineffectiveness in one or more of the three cross-cutting areas—problem identification and resolution, human performance, and a safety-conscious work environment. NRC inspectors cited examples of possible cross-cutting issues: (1) a facility does not have an effective corrective action program that appropriately identified and resolved problems early; (2) a facility employee has not followed correct maintenance procedures, and NRC made a finding associated with the human performance area; and (3) facility management is complacent by not paying attention to detail or adhering to procedures. Our examination of ROP data found that all reactor units that NRC subjected to its highest level of oversight had findings related to one or more of these substantive cross-cutting issues. In addition, recent NRC inspections have found more problems associated with these cross-cutting issues, in part because of new guidance for identifying and documenting them.

NRC CONTINUES TO MAKE IMPROVEMENTS TO ITS ROP IN KEY AREAS

Our 2006 report found that NRC has generally taken a proactive approach to continuously improving its oversight process, in response to recommendations that grew out of the Davis-Besse incident; independent reviews; and feedback that is usually obtained during NRC's annual self-assessment of its oversight process from stakeholders, including its regional and on-site inspectors. Continued efforts will be needed to address other shortcomings or opportunities for improvement, however, particularly in improving its ability to identify and address early indications of declining safety performance at nuclear power facilities. For the most part, NRC considers these efforts to be refinements to its oversight process, rather than significant changes.

Specific areas that NRC is addressing include the following:

- To better focus efforts on the areas most important to safety, NRC has formalized its process for periodically revising its inspection procedures. In particular, NRC completed substantive changes to its inspection and assessment program documents—including those currently guiding the highest level of NRC inspections—to more fully incorporate safety culture.
- To address concerns about the amount of time, level of effort, and knowledge and resources required to determine the risk significance of some inspection findings, NRC has modified its significance determination process, which, according to NRC's 2006 self-assessment, has significantly improved timeliness.

- To address concerns that performance indicators did not facilitate the early identification of poor performance, NRC has modified several indicators to make them more risk-informed for identifying the risks associated with changes in the availability and reliability of important safety systems. In addition, NRC revised an indicator to more accurately reflect the frequency of events that upset reactor unit stability and challenge critical safety functions. NRC is considering options for revising indicators for emergency preparedness and reactor cooling systems. Both NRC's 2006 self-assessment and internal staff survey cited the need to further improve the performance indicators and their associated guidance.
- Although NRC and others have long recognized the effects of a facility's safety culture on performance, NRC did not undertake efforts to better incorporate safety culture into the ROP until 2005, when it formed a working group to lead the agency's efforts. To date, the group has completed guidance for identifying, addressing, and evaluating cross-cutting issues specific to safety culture.

Our 2006 report concluded that NRC's efforts to incorporate safety culture into the ROP may be its most critical future change to the ROP and recommended that NRC aggressively monitor; evaluate; and, if needed, implement additional measures to increase the effectiveness of its initial safety culture changes. We also recommended that NRC consider developing specific indicators to measure important aspects of safety culture through its performance indicator program. While NRC has largely implemented initial safety culture enhancements to the ROP that primarily address cross-cutting issues, it does not plan to take any additional actions to further implement either recommendation before it completes its assessment of an 18-month implementation phase at the end of this year. This assessment will include lessons learned that NRC managers have compiled since July 2006, including insights from internal and external stakeholders about the effectiveness of ROP enhancements.

In addition, we recommended that NRC, in line with its desire to make the ROP an open process, make available additional information on the safety culture at nuclear power facilities to the public and its other stakeholders to provide a more comprehensive picture of performance. NRC has implemented this recommendation by modifying its ROP Web site to fully explain the review process regarding cross-cutting issues and safety culture, and now provides data and correspondence on the reactor units or facilities that have substantive open cross-cutting issues.

#### NRC HAS IMPLEMENTED MANY ACTIONS TO PREPARE ITS WORKFORCE FOR NEW REACTOR LICENSING REVIEWS AND MANAGE ITS WORKLOAD, BUT SEVERAL KEY ELEMENTS ARE STILL UNDER WAY

NRC has prepared its workforce for new reactor licensing reviews by increasing funding for new reactor activities, reorganizing several offices, creating and partly staffing the Office of New Reactors (NRO), and hiring a significant number of entry-level and midlevel professionals. As of August 2007, NRC had assigned about 350 staff to NRO, about 10 percent of the total NRC workforce; however, some critical positions are vacant, and the office plans to grow to about 500 employees in 2008. To assist its staff in reviewing the safety and environmental portions of the applications, NRC plans to contract out about \$60 million in fiscal year 2008 through support agreements with several Department of Energy national laboratories and contracts with commercial companies. NRC also has rolled out several new training courses, but it is still developing content for in-depth training on reactor designs.

NRC is using a project management approach to better schedule, manage, and coordinate COL application and design certification reviews. While NRC has made progress, several elements of NRC's activities to prepare its workforce are still under way, as the following illustrates:

- NRC has developed plans for allocating resources for a design certification application and an early site permit it is currently reviewing, 20 COL applications, 2 additional design certification applications, and a design certification amendment application. However, NRC has not yet developed specific criteria to set priorities for reviewing these applications if it needs to decide which applications take precedence. Without criteria, NRC managers are likely to find it more difficult to decide how to allocate resources across several high-priority areas. Accordingly, we recommended that NRC fully develop and implement criteria for setting priorities to allocate resources across applications by January 2008, which NRC has agreed to do.
- NRC is developing computer-based project management and reviewer tools to assist staff in scheduling and reviewing multiple applications at the same time. For example, Safety Evaluation Report templates are designed to assist COL

reviewers by providing standardized content that will enable them to leverage work completed during the design certification review process. However, the implementation of this and other tools has been delayed. We recommended that NRC provide the resources for implementing reviewer and management tools needed to ensure that the most important tools will be available as soon as is practicable, but no later than March 2008, which NRC has agreed to do.

- NRO established a cross-divisional resource management board early in 2007 for resolving resource allocation issues if major review milestones are at risk of not being met. However, it has not clearly defined the board's role, if any, in setting priorities or directing resource allocation. Because NRO expects to review at least 20 COL applications and 6 design certification, early site permit, and limited work authorization applications associated with its new reactor program over the next 18 months, it may not be able to efficiently manage thousands of activities simultaneously that are associated with these reviews. NRC managers we spoke with recognize this problem and plan to address it. We recommended that NRC clarify the responsibilities of NRO's Resource Management Board in facilitating the coordination and communication of resource allocation decisions, which NRC has agreed to do.

NRC HAS SIGNIFICANTLY REVISED ITS OVERALL REGULATORY FRAMEWORK AND REVIEW PROCESS, BUT SEVERAL ACTIVITIES ARE STILL IN PROGRESS

NRC has significantly revised most of its primary regulatory framework and review process to prepare for licensing new reactors. Specifically, NRC has revised and augmented its rules, guidance, and oversight criteria for licensing and constructing new reactors primarily to provide for early resolution of issues, standardization, and predictability in the licensing process. In making these changes, NRC has regularly interacted with nuclear industry stakeholders to determine which parts of an application's technical and operational content could be standardized and to clarify guidance on certain technical matters. In addition, NRC just completed modifications to its acceptance review process to include an evaluation of the application's technical sufficiency as well as its completeness and made internal acceptance review guidance available last week. While NRC has made progress in these areas, it has not yet completed some ancillary rules and regulatory guidance, or actions to implement certain review process components. For example, because NRC only recently solicited public comments to further update its environmental guidance, applicants may have more difficulty developing specific COL content for unresolved issues. In addition, while NRC proposed a rule to update physical protection requirements in September 2006, officials told us that it will not be made final until 2008. Furthermore, NRC's limited work authorization rule, while substantially complete, will not be available in final form before October 2007. Lastly, NRC is revising its policy for conducting hearings on both the contested and uncontested portions of applications.

In addition, NRC is refining its processes to track its requests for additional information to each applicant. In some instances, applicants using the same reference reactor design may be asked the same question, and one applicant may have already provided a satisfactory answer. With a completed tracking process, the second reviewer could access the previously submitted information to avoid duplication. We recommended that NRC enhance the process for requesting additional information by (1) providing more specific guidance to staff on the development and resolution of requests for additional information within and across design centers and (2) explaining forthcoming workflow and electronic process revisions to COL applicants in a timely manner. NRC has agreed to do so.

In conclusion, the safe operation of the nation's nuclear power facilities has always been of fundamental importance and has received even more emphasis recently as the nation faces an expected resurgence in the licensing and construction of new nuclear reactors to help meet our growing electricity needs. Our assessment of the ROP has found that NRC has made considerable effort to continuously improve its oversight activities and to prompt industry to make constant management improvements. However, while the current oversight process appears logical and well-structured, NRC recognizes the need to make further improvements in such areas as the timeliness of its significant determination process and the redefinition of some performance indicators. Regulating the often complex and intangible aspects of safety culture is clearly challenging. While NRC had taken some concrete actions to incorporate safety culture into the ROP and now has a structured process in place through its inspection program, we recommended that NRC continue to act to improve its safety culture efforts. NRC plans to evaluate the effectiveness of its current actions at the end of this year before considering any further implementation

of our recommendations. We continue to believe that NRC needs to give this issue attention in further revising the ROP so that it can better identify and address early indications of declining safety performance at nuclear power facilities.

NRC has made important strides in revising its regulatory framework and review process for licensing new nuclear reactors to improve timeliness and provide more predictability and consistency during reviews. Nevertheless, NRC's workforce will face a daunting task in completing certain regulatory actions currently under way and implementing this new process as it faces a surge in applications over the next 18 months—the first of which has just been submitted. We identified four actions that NRC could take to better ensure its workforce is prepared to review new reactor applications and that its review processes more efficiently and effectively facilitate reviews, and NRC agreed to implement them.

Mr. Chairman, this completes my prepared statement. I would be happy to respond to any questions you or the other Members of the Subcommittee may have at this time.

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## GAO HIGHLIGHTS, OCTOBER 3, 2007

### WHY GAO DID THIS STUDY

The Nuclear Regulatory Commission (NRC) is responsible for overseeing the nation's 104 commercial nuclear power reactors to ensure they are operated safely. Since 2000, NRC has used a formal Reactor Oversight Process (ROP) to oversee safety. NRC is also responsible for licensing the construction and operation of new reactors. Electric power companies have announced plans to submit 20 applications in the next 18 months.

This testimony is based on GAO reports that reviewed (1) how NRC implements the ROP, (2) the results of the ROP over several years, (3) the status of NRC's efforts to improve the ROP, (4) NRC's efforts to prepare its workforce and manage its workload for new reactor licensing, and (5) NRC's efforts to develop its regulatory framework and review processes for new reactor activities. In conducting this work, GAO analyzed programwide information and interviewed cognizant NRC managers and industry representatives.

### WHAT GAO RECOMMENDS

GAO made recommendations to NRC to improve the effectiveness of (1) the ROP in identifying declining safety performance at nuclear power facilities before significant safety problems develop and (2) NRC's workforce and processes in facilitating the review of new reactor license applications. NRC generally agreed with the recommendations.

### NUCLEAR ENERGY

#### *NRC Has Made Progress in Implementing Its Reactor Oversight and Licensing Processes but Continues to Face Challenges*

##### *What GAO Found*

In implementing its ROP, NRC uses various tools and takes a risk-informed and graded approach to ensure the safety of nuclear power facilities. The ROP primarily relies on physical inspections of equipment and operations and quantitative measures or indicators of performance at each facility to assess the status of safety and determine appropriate levels of oversight.

Since 2001, NRC has made more than 4,000 inspection findings that reactor unit operators had not fully complied with safety procedures. Almost all of these findings were for actions NRC considered important to correct but of low significance to safe operations. As a result of NRC inspections, more than 75 percent of the nation's reactor units received some level of increased oversight while five units were subjected to NRC's highest level of oversight for long periods because their performance problems were more systemic.

In 2006, GAO reported that NRC has generally taken a proactive approach to improving its ROP. However, concerted efforts will be needed to address shortcomings, particularly in identifying and addressing early indications of declining reactor safety performance. For example, NRC is implementing several enhancements to the ROP to better assess a facility's safety culture—organizational characteristics that ensure safety issues receive the attention their significance warrants. GAO made recommendations to further improve this effort, and NRC has taken initial steps to implement them.

NRC has taken important steps to prepare its workforce for new licensing reviews, but several key activities are still underway and uncertainties remain about its management of the expected surge of applications. For example, NRC has increased funding, hired hundreds of new employees, and created and partly staffed a new office. However, NRC has not completed its development of some computer-based tools for enhancing the consistency and coordination of application reviews and has not fully developed criteria for setting priorities if the workload exceeds available resources. Also, while NRC's Office of New Reactors established a resource management board for coordinating certain office review activities, it has not clearly defined the extent of the board's responsibilities. NRC agreed with recommendations GAO made to further improve its workload management.

NRC has revised most of its primary regulatory framework and review processes, including its rules, guidance, and oversight criteria to provide for early resolution of issues, standardization, and enhanced predictability. However, NRC has not yet completed some associated rules, guidance, and review process components, including revisions to its environmental guidance, its hearing process, and its process for requesting additional information from applicants. Without these components, expected efficiencies and predictability may be limited regarding the total time an applicant needs to obtain a license. NRC agreed with a recommendation GAO made to further improve its application review process.

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RESPONSES BY MARK GAFFIGAN TO ADDITIONAL QUESTIONS FROM SENATOR BOXER

*Question 1.* In your 2006 report on NRC's oversight of nuclear power safety, you cited instances of unmonitored releases of tritium into groundwater at nuclear plants as an area in which the NRC was conducting further assessments and may develop additional inspection procedures. Can you comment on what steps the NRC has taken to improve oversight in this area and prevent the release of tritium?

*Response.* At the same time our reactor oversight process (ROP) report was issued in September 2006,<sup>1</sup> NRC's Liquid Radioactive Release Lessons Learned Task Force issued a report that made 26 recommendations applicable to NRC and nuclear power facility operators. The task force was formed because radioactive liquid—typically water contaminated with tritium or other radioactive materials—had been released to the environment in an unplanned and unmonitored fashion on or near at least 15 nuclear facilities, primarily from 1996 to 2006. Based on the data available to NRC, the task force did not identify any instances where the health of the public had been adversely affected. However, the task force found that the potential exists for unplanned and unmonitored releases of radioactive liquids to migrate offsite into the public domain undetected under NRC's regulatory requirements. Because of this possibility, the task force recommended that NRC enhance both its regulations and regulatory guidance to address unplanned, unmonitored releases; conduct additional reviews in the areas of decommissioning funding and license renewal; and improve public communications. In September 2007, the NRC Commissioners approved revisions to the ROP regarding the significance determination process for the effluent release program that would (1) include spills or leaks, (2) make clarifying changes to the text and logic diagram for the significance determination process, and (3) reflect the significance of monitoring to public radiation safety in the radioactive environmental monitoring program branch. The NRC Commissioners also directed that NRC's public Web page include a summary of the actions being taken to close out the task force recommendations and regular updates on the status of any tritium groundwater contamination incidents. As of late October 2007, NRC's Web page did not yet provide the implementation status of the 26 recommendations.

Our September 2006 report noted that the nuclear power industry had undertaken a Ground Water Protection Initiative to identify actions to improve nuclear power facilities' management and response to instances of inadvertent releases that fall outside current NRC requirements and are below NRC's limits for routine, planned, monitored, and documented releases. In August 2007, the industry issued final guidance for ground water protection that describes the initiative's purpose, prescribes necessary elements and actions for a timely and effective protection program, and identifies communication and oversight steps for the licensee to conduct.

*Question 2.* Your written testimony notes that there are several rules and additional regulatory guidance related to new reactor license applications that have not yet been completed by the NRC. For example, you stated that the NRC only recently solicited public comment on updated environmental guidance for new applications.

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<sup>1</sup> See GAO, Nuclear Regulatory Commission: Oversight of Nuclear Powerplant Safety Has Improved, but Refinements Are Needed, GAO-06-1029 (Washington, D.C.: Sept. 27, 2006).

How concerned are you that rules and regulations that are not yet finalized will impact the application process? Can the NRC make a decision on new license applications without finalizing the pending rules and regulations?

Response. Our September 2007 report found that while NRC had made progress in completing several major actions to revise its regulatory framework and processes for licensing new reactors, it had not yet completed several rules, guidance documents, and processes related to new reactor licensing.<sup>2</sup> Furthermore, we stated that uncertainty about these remaining components may limit expected efficiencies and predictability of the regulatory process because they were not complete. Our concern about the implementation of the review process primarily stems from the sheer volume of the workload that NRC's staff and contractors face in reviewing so many applications simultaneously, the newness of the new reactor licensing process, and the first implementation of many new rules and guidance. This may be especially problematic in that NRC plans to use contractors to perform at least one-third of the review.

Since our report was issued, NRC has made progress in completing some of these components:

- On September 26, 2007, NRC published its revised acceptance review guidance.
- On October 3, 2007, NRC's Notice of Proposed Rulemaking on assessment requirements of aircraft impacts for new reactor designs was published in the *Federal Register*. NRC's target is to complete the rule by September 2008.
- On October 9, 2007, NRC's final rule on Limited Work Authorization was published in the *Federal Register*. This regulation will become effective on November 8, 2007. NRC expects to complete its limited work authorization guidance by January 2008.

However, NRC has delayed issuance of its final Part 73 security rulemaking—completion is now set for September 2008—in part because of the volume of comments received. NRC is currently assessing how this delay might affect the review of applications and is using existing forums to discuss and clarify necessary application content to applicants, including those areas where the existing and proposed regulation differ. NRC currently expects these rules to be completed in advance of when licensing decisions would be made. Should they experience further delays, NRC plans to license the new reactors to existing regulations and would subsequently issue orders with new requirements, as is the process with regulations affecting the 104 operating reactors.

Regarding NRC's environmental review framework, our September 2007 report noted that NRC made the draft Environmental Standard Review Plan (ESRP), which provides guidance for NRC staff, publicly available earlier this year. In response to some industry stakeholders, NRC extended the comment period for the draft guidance to October 14, 2007, and NRC is currently reviewing the comments. NRC has directed applicants to use the draft Environmental Standard Review Plan's content in application development, rather than NRC's environmental regulatory guide, which it plans to update in 2008 because, for example, it does not address environmental justice or severe accidents. NRC has also directed applicants to review license renewal guidance related to specific technical areas.

NRC has dedicated considerable effort to putting its regulatory framework and review process for licensing new reactors in place. However, some important elements of its framework—associated with completing guidance, resolving certain technical issues, and implementing the review process—will not be completed for at least several more months. Accordingly, we are concerned that the regulatory framework needs to be completed to enable NRC staff reviewers to efficiently and effectively perform their reviews and to improve the review process's predictability and transparency for applicants and third party stakeholders.

*Question 3.* Your latest report notes that the NRC has made progress in preparing for new reactor licensing, but that there is still work to be done. With all the focus on the NRC streamlining the license application process and ensuring timely review, is GAO concerned that the NRC could be pressured into cutting corners to speed the review process?

Response. It is too early to tell whether NRC's efforts to streamline the license application review process might result in corners being cut in the staff's review in such areas as safety and environmental protection. In general, we found that NRC intends for its revised process to be predictable, consistent, and effective. Perhaps most notably, the NRC commissioners did not accept some 2007 internal task force

<sup>2</sup>See GAO, Nuclear Energy: NRC's Workforce and Processes for New Reactor Licensing Are Generally in Place, but Uncertainties Remain as Industry Begins to Submit Applications, GAO-07-1129 (Washington, D.C.: Sept. 21, 2007).

recommendations that encouraged adopting shorter review time estimates for each application than appeared feasible in light of its resource and workload estimations of what it will take to conduct reviews properly. In addition, NRC managers told us that the overall combined license review time estimates would be adjusted in NRC's schedule to reflect each application's sufficiency and completeness and whether it referenced, for example, a certified design or an early site permit.

*Question 4.* The written testimony of David Lochbaum of the Union of Concerned Scientists states that the NRC has made efforts to improve safety culture at reactor sites, but that the culture at the NRC itself also needs to be improved. Mr. Lochbaum says that senior managers at the NRC need to be replaced with new blood. Does the GAO agree with Mr. Lochbaum? Has the GAO encountered any problems with the safety culture at the NRC or problems with its senior management during any of your reviews?

Response. While our September 2006 report made two recommendations for improving NRC's ability to identify declining safety performance at nuclear power facilities before significant safety problems develop, we did not identify any concerns with either NRC's safety culture or its senior management during this review or our subsequent reviews of NRC's human capital<sup>3</sup> or new reactor licensing. Specifically, our September 2006 report found the ROP appears logical and well-structured, NRC modified the ROP to add safety culture considerations in response to the Davis-Besse incident, and NRC recognizes the need to make further improvements. In addition, we would note that NRC has benefited from the continuity and experience of senior NRC managers as it has reorganized to create a new office to review new reactor license applications. We would also note that many senior managers are, or will soon be, eligible to retire.

We agree with Mr. Lochbaum that NRC needs to encourage new approaches and open-mindedness. Furthermore, we continue to believe that NRC needs to give the issue of safety culture attention so that it can better identify and address early indications of declining safety performance at nuclear power facilities.

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RESPONSE BY MARK GAFFIGAN TO AN ADDITIONAL QUESTION FROM SENATOR INHOFE

*Question.* The GAO's two recent reports, one on the ROP and one on the NRC's readiness to receive new plant applications, included recommendations for improvement. Do you believe the NRC is acting responsibly to implement those recommendations?

Response. NRC generally agreed with the recommendations in both of our reports and has initiated steps to implement them. We believe NRC has acted responsibly to this point. However, it is too early to tell whether NRC's actions will adequately address our concerns and effectively implement our recommendations.

Senator CARPER. Thank you, Mr. Gaffigan.

Thank you for your testimony. Tom Loller, a member of my staff, just handed me a note which says, "Mr. Gaffigan and his team at GAO have been invaluable to this subcommittee and their work is greatly appreciated."

Mr. GAFFIGAN. Thank you. I appreciate that.

Senator CARPER. Praise like this from guys like that rarely comes.

[Laughter.]

Mr. GAFFIGAN. Hopefully, Tom got the check.

[Laughter.]

Senator CARPER. In the interest of full disclosure, I think that is probably against our new ethics laws.

Mr. GAFFIGAN. So much for independence.

Senator CARPER. There you go.

Let me start off with a question for you, Mr. Gaffigan. Then we will turn to Senator Sanders and back to Senator Voinovich. No, I have to go to Senator Voinovich, then Senator Sanders.

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<sup>3</sup>GAO, Human Capital: Retirements and Anticipated New Reactor Applications Will Challenge NRC's Workforce, GAO-07-105 (Washington, D.C.: Jan. 17, 2007).

First of all, Mr. Gaffigan, in your testimony you say that concerted efforts by the Nuclear Regulatory Commission will be needed to address shortcomings in the reactor oversight program, particularly in identifying and addressing early indications of declining reactor safety performance. Can you just, I know you have touched on this already, but can you just go back and discuss these shortcomings a bit more and provide any recommendations on how the NRC could address them?

Mr. GAFFIGAN. Sure. We primarily focused in our report on this issue of safety culture. It kept coming up and up again. In fact, in our report, as early as 1989, the discussion of safety culture was out there with NRC. We felt it was very important that in terms of developing some early indications of performance problems, that this issue of safety culture needed to be addressed.

Also that the performance indicators themselves, as was mentioned by one of the commissioners, tended to be lagging indicators. So the combination of those two things, a focus on the safety culture and some aspects of trying to develop performance indicators of this, is what we recommended.

Senator CARPER. All right. Mr. Lochbaum sort of gave an NRC report card, and a passing grade in a couple of areas and failing grades in a couple of areas. Just mention again just real briefly, Mr. Lochbaum, the areas where you felt that NRC earned failing grades. Then I am going to ask our other two witnesses just to comment briefly as well.

Mr. LOCHBAUM. We felt that the NRC didn't earn a passing grade in the areas of consistently enforcing the regulations they develop. They just don't do a good job there. The second area is in instilling confidence in the regulated, the licensees, the Government and the public, that they are an effective regulator and these plants are being operated safely. Those are the two areas we felt they fell down.

Senator CARPER. OK, thank you.

Mr. Gaffigan and then Mr. Fertel, if you would, your comments.

Mr. GAFFIGAN. Sure. I would just add that NRC is doing a lot of great things. In the survey, they are the number one place to work, according to their employees. But they cannot be complacent. They mentioned the problem with Palo Verde was complacency. NRC's job is never going to be done. They are never going to be able to say, we are done, we have declared victory. They need to be constantly vigilant. If they do that, I think they will have great success.

Senator CARPER. All right. Mr. Fertel?

Mr. FERTEL. I certainly agree—

Senator CARPER. Go back to the two specific points of Mr. Lochbaum, if you will.

Mr. FERTEL. I certainly agree on neither NRC and certainly nobody in the industry should ever be complacent. So I would start with that.

I think going to what David said on failing grades and on enforcement, I think you have to look at results. If you look at results, since the ROP has been put in place, which is 2000, we have only had one plant in any extended shutdown, and that was Davis-

Besse, unfortunately, in Senator Voinovich's State, not 51, but just one.

If you look at results during that period, on almost every indication from safety performance that the World Association of Nuclear Operators looks at, there have been steady improvements. From production, which is not a safety indicator, but it is a performance indicator, you have seen continued improvements.

So you are seeing the plants operating better, because the process is forcing people to look at things correctly, both from a safety standpoint and a reliability standpoint. So I think you look at that. Now, that doesn't mean that NRC shouldn't enforce certain things. David gave an example of Indian Point and the sirens. I am appalled that they have not been able to do what they should have done there, with the legislation that came out of this particular committee. On the other hand, they have a siren system that works. They got a \$130,000 fine for missing the date they should have met. They should be punished for missing the date they should have met.

There was no threat to health and safety when they missed that date. They missed a regulatory order. They didn't satisfy the law that was passed there. But the public was still protected around that site.

So the appropriate enforcement may have been a \$130,000 fine and NRC all over them, as opposed to a \$22 million cumulative fine when there was no real threat to safety at that point. So I am not condoning the behavior, I am saying you need to look at it correctly.

Senator CARPER. All right, thanks. One last quick question, then I am going to yield to Senator Voinovich.

Again, Mr. Gaffigan, NRC bases its oversight process on the principle that licensees have programs in place to routinely identify and to address performance issues without the NRC's direct involvement. Given your concern over NRC's inability to identify early indications of declining plant performance, do you believe that NRC is overly reliant on the licensees to identify performance issues?

Mr. GAFFIGAN. As it relates to the performance indicators, that is a self-reported, voluntary system. So I think to some extent, NRC is trying. For example, in the aspects of developing a performance indicator for a safety culture, they are really struggling with that they will have to work with industry to develop the performance indicator.

But I think NRC in and of itself has a lot of folks who work on these issues and as a baseline have to start with the industry and what the industry has. But I wouldn't characterize them as overly reliant.

Senator CARPER. My time has expired. Just very briefly, Mr. Fertel.

Mr. FERTEL. Just very briefly, you have 32 white findings right now in ROP. Twenty-two of the thirty-two are a brand-new performance indicator that was put in place about a year ago, which is driving the white findings. It is a performance indicator that the industry advocated, because we think it is a much better indicator of performance at the sites from a safety standpoint.

There is no silver bullet on performance indicators for safety, culture or other things. But performance indicators serve a very important purpose in changing behavior at the plants, as well as providing insights to NRC.

Senator CARPER. Thank you.

Senator Voinovich.

Senator VOINOVICH. Thank you, Mr. Chairman.

I would like to follow up, Marvin, you were here during the hearing. It is this whole issue of the safety culture that is out there. It appears that the same controversy still lingers. I would like your comment and the comment of Mr. Gaffigan and Mr. Lochbaum about that issue. Because I don't see why someone would object, they are probably worried about, they want the commission micro-managing the operations. But in terms of some objective standard as to courses that people are taking and that kind of thing. What is the problem?

Mr. FERTEL. Senator, I was here for the hearing where this came up last time. On the industry side, and think both you and Senator Carper can brief somewhat on that. We have gone that far. We have a principles document that came out from INPO. We do self-assessments against that principles document. The expectations are very high at the plants that people are behaving consistent with the principles document. INPO evaluates safety culture in every evaluation that they do at the sites.

From an industry standpoint, I am sensitive to having a regulator trying to get into management. Safety culture is even softer than management in some places. That doesn't mean that they shouldn't continue to look at how they are implementing their cross-cutting program, which has the potential, I think, to do what you are looking for once it matures a bit. It is truly kind of in its infancy, in its first year or so of implementation.

So I think you may want to give them the opportunity to come back in maybe a year and tell you where they think they are on that.

Senator VOINOVICH. Mr. Chairman, I would like to get it in writing about what they are doing.

Does NEI have anybody from your organization that goes out and visits with these people and kind of tries to identify where something may not be the way it is supposed to be, understanding that if you have something like Davis-Besse or some of these other things that they really do great harm to the entire industry?

Mr. FERTEL. INPO does that 100 percent of the time for the industry. I think if I looked at what NEI and INPO do for it, we probably spend, and it is less going out to the plants, but it is dealing on issues that we know will have high visibility for this industry. Security, for instance, we reacted very firmly and initially to the Peach Bottom situation.

So we do in certain areas, but INPO does it day in and day out. Safety culture was taken very seriously. Because the failure at Davis-Besse was not only a failure of the management there and the NRC, it was a failure of our INPO process, too, to have found that. So it was taken very seriously, and there have been significant changes on our side.

Senator VOINOVICH. Mr. Lochbaum?

Mr. LOCHBAUM. I would agree with what Marvin said. The NRC, I attended several meetings between the NRC and the industry about safety culture, where the NRC doesn't legislate how many hours of training somebody receives, but they try to bring together the best practices amongst the industry, and also the IAEA. So it is not just NRC and INPO, it is worldwide, what are the best practices people do to address this.

Where the rubber hits the road, if you look at how the NRC has dealt with the problems of Palo Verde, the NRC has done an excellent job of taking an issue and pulling the string to see how broad it extended, which is not what they did a good job of at Davis-Besse prior to 2002. So I think we are seeing the best of what it can be, we just need to broaden that so it is consistently what the agency does.

Mr. GAFFIGAN. Senator, I would just add, if management issues are starting to impact safety, then it is something we need to look at. When Davis-Besse was talked about, the safety culture issue came up. When we asked the question about Palo Verde, the issue of complacency came up. So I would say that NRC needs to pay attention to those things that impact safety. If it is a management issue, I understand the sensitivities. But NRC needs to be involved. I think they have done a better job with Palo Verde versus Davis-Besse.

Senator VOINOVICH. Thank you.

Senator CARPER. All right. Senator Sanders, you are recognized for 5 minutes.

Senator SANDERS. Thank you very much.

Mr. Lochbaum, in your testimony you mentioned that the Union of Concerned Scientists supports S. 1008, as it would help to restore confidence in the NRC. I thank you very much for that, because that is my legislation. But could you describe why the States of Massachusetts, New Jersey, New York and Vermont have lost confidence in the Nuclear Regulatory Commission and what has driven these States to take the step legally to intervene to oppose these reactors in their State?

Mr. LOCHBAUM. Probably the largest common denominator between those three States is that the reactor oversight process was implemented in April of 2000, prior to 9/11 and what that meant for this Country. Those States are concerned that the activities that the NRC is doing, like power up-rates and license renewals, are being done as if 9/11 didn't happen. I don't think those States, from the interactions I have had, think that the NRC has done enough to ensure that the security threat, the terrorist threat, is being incorporated into the decision-making about whether license renewal is a good thing or a bad thing, or all the things necessary to make sure that it continues to be a safe and secure thing 20 years down the road are being undertaken down the road.

Senator SANDERS. In general, how do you feel about States being more involved in the process?

Mr. LOCHBAUM. I think it benefits. From the observations I have had from 11 years at UCS, the more people who participate, whether it is States or the public or NRC or the regions, even the regions of the NRC, everybody has knowledge, everybody has input into the process. The agency can make a better decision for everybody when

they equally, where they take advantage of all that input, rather than try to exclude it or discount it.

Senator SANDERS. It seems to me that that process enhances public confidence in the process.

Mr. LOCHBAUM. Exactly. The times that I have gone to a meeting with a preconceived notion about what was right or wrong and heard what the licensee said or what GAO said or what the States said, I have often changed my mind based on the knowledge I gained through that process.

Senator SANDERS. On this issue, I don't think there is anybody who is on a different side. There is nobody, no matter what one's view on nuclear power, who does not want nuclear power to be absolutely as humanly safe as possible. The problem here is, given the lethality of the waste, you can't be 99.9 percent safe. If that is the case, you could have a disaster. I would hope that we could work together on that.

Mr. Lochbaum, you mentioned in your testimony that the Indian Point Plant, which has had numerous safety violations, got a simple slap on the wrist, a mere one day fine for violations that have been ongoing since January 2006. You called NRC "not an aggressive enforcer" but "a meek and mild enabler of non-conforming behavior." Is this unusual for the NRC or is this the way NRC approaches enforcement at most of the U.S. nuclear facility?

Mr. LOCHBAUM. It is very consistent with their pattern of being meek and mild. We did a study a few years ago comparing 2 years worth of enforcement by the agency against individuals and against corporations. The NRC, through people, individuals, either the industry, took other kind of sanctions against individuals. Corporations who did much more serious things and put Americans in much greater harm, it was a letter of reprimand. I don't even know if their parents had to sign it or not.

[Laughter.]

Mr. LOCHBAUM. Other sanctions that really amounted to nothing. So the NRC doesn't really have a risk-informed enforcement policy. They enforce against those who are least able to defend themselves. That is not the way it should be.

Senator SANDERS. Mr. Gaffigan, would you like to comment on that?

Mr. GAFFIGAN. I would only add that our work didn't look particularly at what they do once they find the inspections. But they are in a position where they have to look at what is in front of them and what is provided to them. In terms of taking enforcement actions, we didn't particularly look at that particular issue in our work.

Senator SANDERS. Mr. Fertel, did you want to comment on that?

Mr. FERTEL. I think you can always find specific examples where you could argue they should have done more, and some industry people would argue they should have done less. I think Chairman Carper asked the question about, if you make column four, isn't it a badge of shame. The answer to that is, yes, sir, it is. The enforcement sometimes doesn't have to be a civil penalty that can be effective. But the enforcement can be the image of your company, the performance of your people and what it does to basically how you look across the industry.

There is tremendous peer pressure in the industry, Senator Sanders, to perform well. Any plant that is not performing well and any company that isn't performing well knows about it not only from the NRC, which is where your focus is right now, but from their peers. So I think you can look at enforcement, and I won't defend NRC's enforcement program one way or the other, but it is a much bigger picture. You made a very correct statement when you said there is no difference among anybody where you stand on nuclear energy from the standpoint of wanting to operate safely.

Senator SANDERS. Of course not.

Mr. LOCHBAUM. There is no light between anybody.

Senator SANDERS. Let me just ask—am I over time?

Senator CARPER. A little.

Senator SANDERS. Just a very brief response. Does anybody here have any concerns with the possibility of dozens of new nuclear plants being created and we don't quite know how to get rid of a very lethal waste? Mr. Lochbaum, is that a concern?

Mr. LOCHBAUM. I agree and slightly disagree with Commissioner Jaczko's issue to that. Spent fuel storage today isn't as safe and secure as it can be. If we had a number one change to make, we would accelerate the movement of irradiated fuel from spent fuels into dry casks. It is most vulnerable and it is least secure when it is in the spent fuel pools. If we could move that irradiated fuel into dry casks, even though it is still stored onsite, the threat profile and the safety levels, the safety risk drops tremendously, even though you have more casks on site. So that is what we do.

Senator SANDERS. With a half life of what, tens of thousands of years?

Mr. LOCHBAUM. That is correct.

Senator SANDERS. Are we comfortable that 500 years from now this stuff will be safe?

Mr. LOCHBAUM. I won't be around to confirm it one way or the other.

[Laughter.]

Mr. LOCHBAUM. But I think even with that time horizon, I think that is the right thing to do now to set the—

Senator SANDERS. You are saying that is the best option?

Mr. LOCHBAUM. That is correct.

Senator SANDERS. I don't know, I am not a nuclear engineer, but God knows what happens, it makes me a little bit nervous about such toxic and lethal stuff hanging around for thousands of years.

Mr. Chairman, thank you very much.

Senator CARPER. You bet. One of the subjects for a committee hearing that we are considering for maybe the first part of next year is what to do with nuclear waste beyond Yucca Mountain.

Senator SANDERS. Delaware I think was—

[Laughter.]

Senator CARPER. I think a little farther north. Delaware is too small, we need a big State like Vermont.

[Laughter.]

Senator CARPER. Mr. Lochbaum, in your testimony, you asserted that the NRC needs a change in management. As it turns out, they are about to have a large turnover in their workforce. That could certainly open up some management slots, I suspect.

What are some of the management problems that you believe exist at the NRC and how do you suggest that they be addressed?

Mr. LOCHBAUM. The problem the NRC has is that they never really think outside the box when a challenge comes up, whether it is Davis-Besse or any other challenge they have, whether it is trying to meet the new reactor licensing process. They look at what they have done for the past 30 years and make minor tweaks here and there. Because people have been around for 30 years, so it is what they have been trained in, it is the way they have always done business.

I am not suggesting that anybody forces people out the door. But as people leave, we are suggesting that you look for the best candidate, whether that is persons inside or outside, so that outside new blood can look at things, figure out new ways, bring new ways of doing things from wherever they came from, whether it is DOE or elsewhere, and become agents of change. I think that would also benefit the NRC's own safety culture. There has been a lot of talk about safety culture at reactor plants. The NRC's own internal safety culture is also a problem that needs to be fixed.

I get more calls from NRC workers with safety concerns, whistleblowers, than from all nuclear powerplants combined. It has been that way for years running. That problem where people working at the agency are afraid to raise safety issues needs to be addressed.

Mr. Gaffigan pointed out that the NRC is the number one place to work for. I can attest it is the number one place to work against as well. The NRC can learn it, they are very good people, very good staff. They just need some management help, better generals, if you will, to put that workforce into play.

Senator CARPER. All right, thanks.

Mr. Fertel, we keep coming back, I am going to take one more run at it. In my view, what could the NRC do differently do identify and address early indications of declining reactor safety performance?

Mr. FERTEL. Again, Senator, I get asked the same question on Wall Street about what they could use to rate utilities. The reality is there is no silver bullet. There is no single performance indicator. It is the cumulative weight, the one thing the ROP does significantly better than the old systematic assessment of licensee performance is it does it almost in real time. Not ahead of it, necessarily, but it is almost in real time.

So what you are seeing, whether it is Palo Verde or the other 10 plants, you are seeing the NRC increase inspection activity pretty early, much earlier than ever before in their process. That is due—

Senator CARPER. Just repeat that again. It bears repeating. Say that again.

Mr. FERTEL. What you are seeing them do with the new ROP is increase their inspection activity, because they are seeing declining performance much earlier than they ever did before the ROP went into place.

What you don't have, and if we had it we would honestly share it, because we would want to use it, is a leading indicator that tell us today that years from now this plant or a year from now this plant is going to get into the ditch. You are getting that, but you

don't get it before you start to see the trend. But you are catching it now much better. It is a much better process for catching it. But there is no silver bullet, at least that we can find yet. Believe us, we are looking, too.

Senator CARPER. All right, thank you.

Let me ask you, if I could, one last question, then I will yield to Senator Voinovich. Again, Mr. Fertel, and the other may want to comment on this as well, just list for us if you will the most important ways the NRC can impact either positively or negatively the trend toward new nuclear construction.

Mr. FERTEL. On the positive side, I think, and I don't know if David has looked at it, they have brought some pretty good, new creative blood in to run the new reactor organization at a management level. They are bringing in staff below that that actually is relatively new. From a standpoint of new people that are going to be there for a while, I think that is good.

On the negative, one of the things that has happened post-9/11 at NRC is they have been out of process a lot, for good reason early on, because of what happened on 9/11 and the need to take immediate actions. But they have been out of process from a transparency standpoint, from a rulemaking standpoint. One of the fears we see is, as you bring in new people to be regulators, and there isn't a regulatory process that is well-defined and being used, you can have individuals making their own decisions. That could be a good decision for safety or timing or it could be a bad decision. So one of the things we need to have them do is get more disciplined in their process. That may even help in some of what David is referring to on the management side.

Senator CARPER. My time is expired, but Mr. Lochbaum, if you could respond very briefly.

Mr. LOCHBAUM. Just very briefly, I agree with what several Senators had said during the opening remarks about the existing reactors need to be maintained safely. I think a mis-step at an existing reactor is probably the biggest thing that could set back anybody's construction programs. I am focused on existing reactors less than new reactors, because that is where I think things could go wrong and hurt the most.

Senator CARPER. Good point.

Senator Voinovich.

Senator VOINOVICH. Yes, it gets back to human capital. They are going to net up 200 as a result of hiring. I remember Ed McGaffigan saying on several occasions, we are getting all these new people in and what really is a concern to me is, can we train them up fast enough to do the job they are supposed to do.

Would any of you want to comment on your observations in terms of the training program for the new people that are coming in? If you are not familiar with it, then—

Mr. LOCHBAUM. In our written remarks, we had some concerns about the training program for the new reactor organization. At an April meeting, I asked what the training program was. The answer was that it is largely dependent on the job training.

We felt that on the job training is good, but it is not enough. The NRC has a very good training center down in Tennessee, and also in Rockville. That should be their primary thing, with on the job

training filling in the gaps between the formal training program. So we think that training effort needs to be expanded.

We were encouraged when the NRC went back and looked at new reg 1055 that was done largely at the request of the Congress in the 1980s, and some of the lessons learned from the original construction program. So they are looking back to try to capture those lessons and impart them on the new staff.

Mr. FERTEL. Just to follow up for a moment on David's comment on existing plants, the training of new people coming in, they are not all going to new reactors. They are also going to existing reactors. One of the concerns we do have is they need a formal training program, not just from the technical side, but from the regulatory side, on what a regulator does and how a regulator does business.

Mr. GAFFIGAN. Senator, I would just add that in our report, we looked at the two groups, the nuclear reactor regulation group and NRO, the New Reactors Office. Half those people there have been there less than 5 years. That is true, this issue is true throughout Government.

Senator VOINOVICH. Yes. Well, one of the things we have to look at is that there are impediments, they obviously are doing very well at bringing on new people, much better than a lot of the other agencies that are around.

Would any of you want to comment upon the Department of Energy's talking about locating these storage facilities for nuclear waste, where you would be able to move stuff out of dry storage? I think they are talking about four of them around the Country, four or five of them. Also to comment that the public doesn't understand that we have been taking billions of dollars out of them over the years to take care of properly storing nuclear waste. At this stage of the game, I think some companies are suing the Department of Energy because of the fact that they haven't fulfilled their responsibility in dealing with this problem. Do any of you want to comment on this?

Mr. FERTEL. Every company has actually sued the Department of Energy on the waste situation and the contracts, and some have had settlements and others have had court decisions and others are still in process.

We actually believe that with the advent of new plants in this Country and looking out at some of the stuff that is going on around the world, looking at closing the fuel cycle, and if you are going to close the fuel cycle and you are going to build recycling facilities and potentially even fast reactors at some point, centralizing storage at those facilities makes a lot of sense. Going to Senator Sanders' statement, moving places to more centralized locations where you have facilities to treat it would actually make some sense, in this Country or actually any country.

Mr. LOCHBAUM. One thing we have looked at is that the plants that have permanently shut down, like Maine Yankee and Big Rock Point and elsewhere, the only hazard left is the spent fuel. So for those sites, moving the spent fuel and eliminating the hazard to some place like a Federal lab or somewhere, would make sense. For the operating plants, they continue to generate the waste. So it is not as imperative to move that spent fuel from those

locations as it is for the plants that have been permanently shut down.

Senator VOINOVICH. The observation is that where they have wet storage that they do have a capacity onsite to move it to dry storage?

Mr. LOCHBAUM. Yes, that is our understanding.

Mr. FERTEL. Certainly at every existing plant that is true. But we would agree with David's statement that you ought to move it off the shut-down plants first and consolidate it at either a Federal facility or a centralized location. That makes just good sense from every perspective.

Senator VOINOVICH. Right. I think the other thing that the public needs to understand is how long it is going to take for that first plant to become operation. I think it was 2014?

Mr. FERTEL. Closer to 2015, probably. But 2014 is their optimistic goal.

Senator VOINOVICH. So I think a lot of energy is going to be put into this whole issue of waste storage during that period of time. I think most of us, even though we are pushing forward on Yucca Mountain, pretty well understand that as long as Senator Reid is around and Senator Ensign, probably any Senators from Nevada, they are going to do everything they can to make sure it doesn't happen. So I think we have to get real about the issue.

Senator CARPER. Thank you.

I think that is a wrap. I want to say to each of our panelists on our second panel, thank you very much for preparing for this hearing, for your presentations and your participation and responding to our questions. We may have some follow-up questions we would like to send you. If you could respond to those promptly so we can finalize the hearing record, that would be much appreciated.

Thank you for helping us to think outside the box and maybe to encourage the NRC to do the same. With that, this committee is adjourned.

[Whereupon, at 12:45 p.m., the committee was adjourned.]