BLUE RIBBON COMMISSION ON AMERICA'S
NUCLEAR FUTURE

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REACTOR AND FUEL CYCLE
TECHNOLOGY SUBCOMMITTEE

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MEETING

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DAY 2

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TUESDAY,
AUGUST 31, 2010

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The Subcommittee convened at 8:00 a.m. in Ballrooms D and E of the Washington Marriott at 1221 22nd Street, Northwest, Washington, DC, Pete Domenici and Per Peterson, Co-Chairs, presiding.

MEMBERS PRESENT:

PETE V. DOMENICI, Chair
PER PETERSON, Chair

ALBERT CARNESALE
ALLISON MacFARLANE
RICHARD A. MESERVE
PHIL SHARP

ALSO PRESENT:

TIM FRAZIER, Designated Federal Official
BRIAN SHERON, US Nuclear Regulatory Commission
MIKE MAYFIELD, US Nuclear Regulatory Commission
MARISSA BAILEY, US Nuclear Regulatory Commission
SEAN McGARVEY, AFL-CIO
CAROL BERRIGAN, Nuclear Energy Institute
HENRY CIALONE, Edison Welding Institute
JOHN GUTTERIDGE, US Nuclear Regulatory Commission
JAMES STOUCH, Precision Custom Components, LLC
DIANE CURRAN, Harmon, Curran Spielberg & Eisenberg, LLP
KARA COLTON, Energy Communities Alliance
CLINTON WOLFE, Citizens for Nuclear Technology Awareness
MARY OLSON, Nuclear Information and Resource Service
PAUL BEMBIA, New York State Energy Research and Development Authority

PUBLIC COMMENTERS:

KIRK SORENSEN
ROD ADAMS
LAWRENCE JACOBSON
JOHN KUTSCH

C-O-N-T-E-N-T-S

P-R-O-C-E-E-D-I-N-G-S

(8:01 a.m.)

MR. FRAZIER: Okay, we're going to go ahead and get started. Welcome to Day 2 of the Reactor and Fuel Cycle Technology Subcommittee meeting. And I will just go ahead and turn it over to Dr. Per Peterson.

CHAIR PETERSON: Good morning. Today, our first panel is entitled, "Technology-Neutral Regulatory Framework for New Reactor and Fuel Cycle Technologies." Just like yesterday's panelists, the Commission asked these panelists to consider questions ahead of time.

These are the questions that we asked them: First, what actions and resources are ongoing and needed to develop a more technology-neutral performance based regulatory framework for innovative, new nuclear technologies? And two, what role could expanded NRC anticipatory research potentially play in facilitating future NRC confirmatory analysis for innovative, new nuclear technologies?

The speakers on this panel are asked to keep their presentations to 20 minutes or less. The remainder of the panel time will be spent on questions and discussion with the Subcommittee members. And moving forward, we'll start with our first speaker, Dr. Brian Sheron, who is Director of NRC's Office of Regulatory Research.

Brian, I really appreciate that you can be here this morning. Thank you.

DR. SHERON: Okay, thank you very much. Can everybody hear me? I guess it's on, right? Okay, yes, thank you. I'm Brian Sheron. I'm the Director of the Office of Nuclear Regulatory Research.

Just background, I've been with the government for 37 years, the NRC for 34. And I've worked 22 years in regulatory office NRR from a staff reviewer, up through the associate director of the office, and I've been in the Office of Research about 12 years, both as a division director, and now as the office director.

So, I've kind of worked everywhere in the agency a bit in this area. If I could, the first slide? One thing I wanted to just emphasize is the different roles that are played by the industry, the Department of Energy, and the NRC.

DOE and the industry really have the prime responsibility to develop new technologies, and to test these proposals, provide the testing for them, to submit the proposals with the design basis and sufficient data to demonstrate safety to the NRC.

We don't dictate to the industry what kind of reactors they should license or anything. This is -- we really basically react to what's presented in front of us.

Our job is to establish regulatory requirements to ensure safety of these facilities during construction operations and the maintenance, to perform reviews and inspections to ensure compliance with the regulatory requirements, and we conduct research to support all of these regulatory functions, which is basically looking at what areas need confirmatory analysis to confirm what the licensees are telling us, and to also investigate, for example, any safety issues to determine if new regulatory requirements are needed, and even if some can be relaxed.

Just quickly, we're one of six of the major program offices at the NRC. We're statutory in that we were mandated by Congress in the Energy Reorganization Act in 1975, I believe. Right now, we have about 260 staff in the office. Our research budget is slightly above $68 million. That varies over the course of the year, but that's a rough number.

And we have a wide variety of engineers, scientists, analysts that are educated in various disciplines, and I'll get into that in a little bit.

By the way, the -- that's just contract money. That's not salaries and benefits for the staff. So, if -- the $68 million, if you translated that at roughly $300,000 per staff year, say at the contractor or a laboratory, that may be about 250 or so additional researchers that we have working for us.

I think I was asked if we could show historically what our budget has been. We looked back. This is the previous President's budget. This shows the budget, and our FTE level. As you can see, our budget has gone up slightly.

We really didn't have all the numbers in detail back to when the office was first created back in 1975. I remember I was in the agency then. The budget for the research office was something on the order of $200 million. But I will point out that we were funding a substantial amount of very high-cost research in ECCS analysis.

The Commission, in `73, had passed the ECCS rule, and it said the staff was to go off and confirm the margins in that, and that involved, for example, we had the LOFT Facility in Idaho, which was an actual reactor that we performed loss-of-coolant tests on. We had a big facility called Semiscale there, which was -- LOFT was I think $40 million a year. Semiscale was around $7 million a year.

The co-development for ECCS at the time was -- I think it was $15 or $20. So, there was a fair amount of money being spent on the LOCA area.

Actually, the budget really kind of dropped around the late 1980s. We had finished up most of the ECCS research. LOFT closed down. Semiscale closed down. We had revised the ECCS rule, 10 CFR 40.56, at that time. And so, basically the budget in Research dropped down to I think it was around $100 million, around the late `80s, early

`90s.

Then it slowly drifted down a little bit until it hit -- as you can see here, it was around $65 million in 2007. It's been coming up slightly.

This just shows the wide variety of disciplines that we're responsible for conducting research in. I'm not going to read all of these, but as you can see, it's a fairly wide spectrum, and we have engineers and scientists that are trained in all of these areas.

How do we support license reviews? Well, first we need to make sure applications are complete and of high quality. I kind of always joke with my staff when I said the last thing I want to have happen is for a licensee to come in and shake my hand, and say, "Thanks for doing that research for me. I don't have to do it now."

We believe that the industry needs to really provide the technical basis for the designs that they are proposing. They also need to demonstrate the compliance with all the regulatory requirements.

What we do is we support the licensing reviews. We support our regulatory offices. We develop analytical models, computer codes, that can predict accident behavior, for example. And we will run independent analyses to confirm the licensee's conclusions, so that their plants, for example, are within regulatory limits.

We conduct tests as necessary to independently confirm an applicant's design if there's a controversial area, if we want to look. We normally don't do research that just repeats what the industry has done. In other words, their job is to demonstrate the plant is within he licensing design base.

A lot of times, we look to the margins. Is the plant on the edge of a cliff if they were to, for example somehow exceed a margin if there were additional failures? So, we do a lot of those type of analyses. We do a lot of risk analyses.

We also identify gaps where there's a need for new regulatory and infrastructure. If a new phenomena is observed somewhere -- stress- corrosion cracking in an area we've never seen -- we will go off and do research in that area to confirm what the nature of that is, and whether we need to impose any new regulatory requirement, or whether the existing regulations are still sufficient.

Technology-neutral risk-informed/ performance-based regulatory framework. We developed this a number of years ago. I just want to point out that generic regulatory requirements are set forth in the Atomic Energy Act and its amendment. And just so we're all technology-neutral, really in our mind means that its independent of the nuclear technology that's being proposed, which means that it's independent of the reactor design, or the coolant medium.

But we do recognize that a technology-neutral framework would require design specific regulatory guidance. So, even if you were to come up with a regulatory structure that wasn't unique to the type of coolant or the reactor, the criteria would probably be such that you would have to have very, very design-specific criteria in a guidance document or something.

For example, you may want to say, "I don't want the core to melt during a loss-of-coolant accident." We do that in 50.46 by putting limits on a peak cladding temperature, on the amount of oxidation that can occur. That's all predicated on having zirconium clad fuel.

If you have a different kind of fuel, like a gas-cooled reactor, those limits don't mean anything. They just don't apply. So, you would have to come up with new limits, even if it was technology-neutral.

You would have to come up with some equivalent, that said, "This is what it takes to meet these requirements for a gas-cooled or a sodium-cooled reactor."

The risk-informed and technology-neutral document that describe the technology-neutral framework was issued. It was NUREG-1860, and it was issued actually December of 2007, although it was being worked on much, much before that.

It does use a probabilistic risk-informed approach, and identification and selection of licensing basis events, and the safety classification of systems structures and components, and it also does provide explicit consideration for defense in depth, which is a term we use at the NRC to protect against unforeseen events.

It's based on and interfaces with other parts of 10 CFR. So, it utilizes the existing requirements. And the regulatory guidance supplements are performance based --

I'm sorry, regulatory guidance is needed, as I said before, to supplement the performance-based regulations.

One area we do have to look at, and I'll be quite honest I don't have an answer right now, and that is that I know when I talk with our general counsel's office, they will tell you that in order to promulgate a regulation, there has to be some criteria, some specificity.

And so, it's unclear whether you can actually come up with a general set of regulations that will cover everything, but are specific enough that they would pass a test for being promulgated as a rule.

But the Commission has told us that we should test this framework, this technology-neutral framework, when the application for the NGNP reactor comes in. This is the DOE gas-cooled design.

In summary, a technology-neutral framework requires NRC to develop design specific regulatory guidance for the particular reactor design that is being proposed. Regulatory guidance developed for the most probable industry design concepts that we expect to regulate domestically, which is that we will -- we're not off developing this technology -- or I'm sorry, the regulatory guidance, okay, for every kind of different reactor that people have proposed.

We have to look at the ones that we think are most likely to be licensed, and funded.

Industry must provide the detailed technical information and data to allow us to develop the regulatory infrastructure. We don't want to get ahead of the industry, and like I said, do all the research.

I did point out licensing can be simplified if proposals don't push the envelope. Now, what does that mean? It means that if you're going to come in and you want to change a lot of stuff, and you know, "I don't want a containment. I want to change the EPZ, emergency protection zone, and stuff." That's going to require additional review.

It doesn't mean that we're not going to approve it or anything, it's just it's going to take longer. It's going to be more protracted. We'll probably have more questions, and people -- you know, that adds come uncertainty.

So, again, the more that the designs don't raise new and challenging questions for the agency, we think we can get them done quicker.

And then in conclusion, industry needs to conduct the majority of the research to support the new technology. We can develop regulations from industry's research. There's nothing that says we have to do our own.

They can provide it to us, and we can use it, and we do a lot of cooperative research with licensees when they do come in for applications, and we'll continue to cooperate with industry to identify the most probable future technologies develop a nuclear framework.

We work closely with EPRI and with DOE. We have very periodic meetings with them to understand where they're heading in their technologies.

And just the last slide is some references. If you want to find out any further information about the Office of Research, NUREG- 1925 is a compendium of our research programs that are ongoing. We have a couple extra copies here. If you would like them, can get them to you. As I said, NUREG-1860 is the -- the risk informed and performance based technology-neutral framework licensing document. Thank you.

CHAIR PETERSON: Thank you, Brian. Our second speaker is Mr. Mike Mayfield. He is Director of the Advanced Reactor Program in the Office of New Reactors. Mike?

MR. MAYFIELD: Good morning. Thank you. Just since Brian started setting the stage for how long he's been with the government, I have got 30 years, give or take, of government service and five years in the commercial R&D sector before joining the government.

I am the Director of the Advanced Reactor Program in the Office of New Reactors. Brian set the stage here for how to make this thing work, and maybe I'm going to fail -- there we go.

The Office of New Reactors was created in 2006 to ensure a dedicated organization to consider the licensing of the new reactors that were being considered at that time. We focus on the safe, secure and environmentally responsible use of civilian nuclear power. We don't make the decisions or make -- contribute to the policy determinations about if a reactor should built, but if one is proposed, our job is to do the licensing review.

NRO is responsible for licensing all the new reactors in the US, and at the bottom of this slide, you see the workload that's on the table today. It was getting to be a fair bit of work, and as a lot of the new technologies were being presented to the staff, we concluded they were becoming a bit of a distraction to the licensing activities, much like the new reactors in 2006 were becoming a distraction to the regulation of the operating fleet.

So, we created the Advanced Reactor Program in 2009 to focus on the licensing review of the new technologies, the advanced technologies.

What do we really mean by that? We mean the high-temperature gas reactors that are being proposed by Department of Energy, the integral pressurized water reactors, and I know you heard from two of them yesterday; liquid-metal-cooled fast reactors, and there are a number of these that are being proposed, different technologies, and other conceptual designs.

There was a statement made yesterday, and it appears in a number of places there's some 90 new designs floating around the world. Pretty much any graduate student that sketches something on the back of an envelope and sends it in, it gets counted as a design.

There may be a dozen or so serious designs being proposed today, and you -- I know the committee has heard from most of them. The Advanced Reactor Program is the lead licensing project management organization for all of these advanced designs.

We do leverage activities strongly from the Office of Research, just as Brian was describing. We are using a matrixed organization within the Office of New Reactors. Rather than stand up a completely separate review organization, we're building on the engineering and systems talent that exists in the Office of New Reactors.

As we need to supplement that talent with specific expertise, we go out and hire that expertise, work with the Office of Research to make it available, or we contract either with the DOE National Laboratories or other commercial entities to provide the expertise we need.

We're anticipating submittals as early as 2012, and that's based on industry projections for when they will submit design certification applications. This slide says pre-application work is starting now. In fact, it started as early as 2008. Paul Lorenzini mentioned that yesterday.

So, we've had some extensive interactions with the industry on a number of these designs. We are implementing a structured approach consistent with Commission guidance in preparing for the reviews.

What we mean by a structured

approach? Job one is to make sure we have the regulatory framework and review guidance in place for whatever technologies we're going to take on. Second is to make sure we are ready to review the next generation program once DOE and whatever design is ultimately selected submitted.

The third level of that is to make sure we're prepared to review the integral pressurized water reactors when they are submitted. Frankly, they are probably the first ones in the door for us. And then maintaining awareness of other designs.

Again, there are so many of these. You're basically talking sodium-cooled fast reactors, lead-bismuth fast reactors, then some of the other gas-cooled technologies. You heard from General Atomics yesterday. So, there are a few of these, and then the rest of the 91 that you have to deal with.

The structured approach is consistent with the schedules that the

Department of Energy has talked about, and the layering they see in technologies being ready to come in for design certification review and deployment.

The regulations pertinent to the licensing of nuclear power plants are contained in Title 10 to the Code of Federal Regulations parts 50 and 52. Part 50 contains the technical requirements for the reactors.

Part 52 is the licensing approach of the process, if you will, that the Commission put in place in response largely to some industry interests stemming from the licensing experience of the existing nuclear power plants.

There was a strong interest, and we think Part 52 is providing a stable and predictable licensing process. It's designed to resolve safety and environmental issues before authorizing construction, reduce financial risks to the licensees, and to encourage standardization among the nuclear power plant designs.

Today, we have roughly 104 different operating nuclear power plants. Brian talked about his experience in the regulatory office. I've got some experience there, as well as some in the research office. And all 104 of them are just enough unique that it makes them challenging from both a regulatory standpoint, as well as plant operations.

So, we are encouraging strongly standardization through to the extent that it is practical.

As I mentioned, Part 50 contains the technical requirements for the nuclear power reactors. It focuses on safety and emergency preparedness. The regulations addressing environmental reviews are contained in Part 51, and the regulations related to security are in Part 73.

The current regulations and regulatory guidance are predicated on light water reactor technology. Brian mentioned zirconium-clad fuel as looking at specific regulatory requirements to prevent fuel damage. The light water reactor technology carries through that body of regulations.

However, the Commission has been, and probably for the last decade, has been making increasing use of probabilistic risk assessment, and risk informing regulations and decisions on plant safety.

I think it's safe to say that today, risk-informed decision making is a routine part of the way the Commission and the staff do their business. The NRC is evaluating the need for changes in review guidance to support review of the non-LWR technologies. We're not there yet, but we're getting started.

Now, Brian mentioned the work that research has done on a technology-neutral framework, and it's embodied in NUREG-1860. And as soon as you start talking to anybody on the reactor side of NRC, and we start talking about technology-neutral framework, NUREG-1860 comes up almost immediately.

The licensing strategy for the next generation nuclear plant implements a deterministic but risk-informed approach. So, if we didn't go down the technology-neutral framework path quite deliberately, we don't think it's quite ready for primetime, and the Commission held that view as well, but the Commission -- as Brian indicated, the Commission is interested in testing the technology-neutral framework.

So, we have an activity that will launch, as we get into the review of NGNP, where we will take the 1860 framework out, if you will, for a test drive, and then report back to the Commission on how it compares to the deterministic risk-informed approach that we're using.

The Commission has also expressed interest in the possibility of making more risk-informed changes to the review guidance, rather than all 150 or 250 sections of the Standard Review Plan, are there some of these for the different technologies that don't just bear the same need for review, or review in the same depth.

So, we're looking at that. It is important to keep in mind that while the regulations are based on light water reactor technology, historically the Commission and the staff have been able to use that basic regulatory structure in licensing different technologies, and at the bottom of this slide you see reference to Peachbottom 1, Fort St. Vrain; Clinch River is a fast reactor, sodium-cooled fast reactor, was under licensing review, and the staff has written a preliminary safety evaluation report on the GE Hitachi PRISM design.

So, while Part 50 is largely light water reactor focused, the fact is the staff has figured out, and the industry has figured out how to adapt that regulatory structure to different technologies.

So, in summary, we're working to develop appropriate review guidance and regulatory framework to support timely and thorough reviews of NGNP and the integral PWR designs. We are making use of risk insights, coupled with a deterministic regulatory structure, and we will be using that basic approach in conducting the licensing reviews.

Technology-neutral framework will be explored. The Commission has directed we're going to test the 1860 approach. It is being explored, and looking at how we can move that forward. However, given the technologies that are being presented to the staff in the near term, it simply isn't a compelling interest for us to move forward.

In fact, there is some sentiment from the industry of, "Don't fool around with regulatory structure we already understand. It fits us." You heard Paul Lorenzini talk yesterday about all but about 15 sections of the Standard Review Plan fit his design exactly.

So, there is some sentiment on the part of the industry that's been expressed to us, "Don't make major changes just now, at least not for the first movers in the technologies that are being presented to the staff."

So, while our regulations are not optimized for non-LWR technologies, the fact is if pushed, we can use the existing regulatory framework to license non-LWR technologies. And with that, I thank you.

CHAIR PETERSON: Thank you. Our third speaker is Ms. Marissa Bailey. She is Deputy Director of the Division of Fuel Cycle Safety and Safeguards in the Office of Nuclear Material Safety and Safeguards. Marissa?

MS. BAILEY: Thank you. Since both Brian and Mike set the stage, I'd like to point out that I only have 20 years of government service, unlike Mike and Brian.

I am with NMSS, the Division of Nuclear Materials Safety and Safeguards. That is one of the offices that is mandated by Congress, and essentially we are responsible for regulating the nuclear fuel cycle.

That's the front end, which includes conversion, enrichment and fabrication of fuel -- of fuel that go into power reactors, transportation, and then the back end, which involved transportation, interim storage, disposal and reprocessing if that is where the nation decides to go.

In this presentation, I will be talking about the regulatory framework for licensing fuel facilities. I'll also be discussing the ongoing efforts to develop a regulatory framework for spent fuel reprocessing.

NRC issues licenses for fuel facilities under 10 CFR Part 40 and Part 70. The requirements in this part are technology-neutral, as licenses are issued for possession and use of either source or special nuclear material.

Under Part 40, licenses are issued for possession and use of source material, which includes natural uranium, and thorium. Under Part 70, licenses are issued for possession and use of special nuclear material, which includes uranium-enriched in 235 or 233, plutonium or uranium 233.

Under these parts, applicants and licenses can submit a license application to the NRC for a wide variety of uses of special and source material, including uses that may involve new or advanced technology, as long as the requirements in this Part are met.

To illustrate this point, I'd like to note that a variety of facilities have been licensed under both Part 40 and Part 70. For example, under Part 70, the -- the major facilities that have been licensed include four low-enriched uranium fuel fabrication facilities, AREVA Richland, AREVA in Lynchburg, the Westinghouse facility in Columbia, South Carolina, Global Nuclear Fuels in Wilmington, North Carolina.

We've also licensed two high-enriched uranium fuel fabrication facilities that support the Naval Propulsion Program, and that's NFS in Erwin Tennessee, and BWXT in Lynchburg, Virginia. And we have licensed two uranium Richmond facilities using gas centrifuge technology: The URENCO facility, formerly LES in Hobbes, New Mexico, and the American Centrifuge Plant in Piketon, Ohio.

The gas distribution plants, Paducah and Portsmouth, are certified under 10 CFR Part 76. NRC has also licensed the possession and use of source material at various facilities. This includes Honeywell's uranium conversion facility in Metropolis, Illinois, and other facilities in non-agreement states, whose operations may involve large quantities of natural uranium, or thorium, at concentrations greater than 0.05 weight percent.

Under Part 70, we also have ongoing licensing reviews for three different types of facilities: The Mixed Oxide Fuel Fabrication Facility in Aiken, South Carolina, and I'd like to note this facility is currently under construction; the AREVA Eagle Rock Gas Centrifuge Enrichment Facility, which is to be located in Idaho Falls, Idaho, and the GE Hitachi Laser Enrichment Facility in Wilmington, North Carolina.

And under Part 40, we are currently reviewing an application from International Isotopes for deconversion of -- for a deconversion facility that would deconvert depleted uranium, hexafluoride material, and extract the -- the thorium.

This map just shows the locations of the facilities that I talked about. These are facilities that are currently licensed or are undergoing licensing review by the NRC.

The requirements in Part 70 are risk-informed and performance-based. The process for demonstrating compliance with the requirements in this Part, and which are also expected to be incorporated in Part 40, is technology-neutral. For example, rather than specifying design or operational requirements, 10 CFR Part 70 specifies performance requirements.

In the example that I provided, it's the maximum dose to workers and to the public under "accident sequences." So, we don't specify the design. We don't specify the operation, but we do specify in these regulations the performance requirements.

Special requirements give applicants and licensees flexibility in selecting the methodology to demonstrate compliance.

In regulating fuel cycle facilities, the NRC also relies on guidance documents, such as regulatory guides and standard review plans to guide our staff in performing their functions, including licensing reviews.

These documents may or may not be technology-neutral. For example, the Standard Review Plan for the MOX facility NUREG-1718 would be used by the NRC staff to review the MOX facility. But the Standard Review Plan for fuel cycle facilities, or NUREG-1520, would be used to review other licensee applications under Part 70.

The NRC responds to intent or interest from industry for license applications for new or advanced technology by reviewing existing regulations, and looking at potential regulatory gaps in the regulations or in our guidance.

As an example of that, in 2008, we received three letters of intent from various industry organizations to pursue commercial reprocessing of spent nuclear fuel. In response, the staff is currently considering revisions to our regulatory framework that would be necessary to address a potential licensee application for a commercial reprocessing facility.

As part of this effort, in 2009, we completed a gap analysis of our regulations, and currently, we are developing the regulatory basis for rule-making that would address those gaps.

We've estimated that the resources to complete a draft regulatory basis in the 2011 time frame would be about 12 to 13 FTE and $1.6 million.

Although the NRC staff understands that the current commercially available technology is based on aqueous separation process, we do intend to the extent practical to consider a risk-informed performance-based and technology-neutral regulatory framework for reprocessing.

And finally, I'd like to note that the NRC staff is following the development of public policy debates and decision regarding the disposition of spent fuel. If the policy decision is for reprocessing, it may be necessary to develop insights on the types of regulatory issues that might confront the NRC in the area of advanced reprocessing.

For example, areas for future research consideration could include pyro reprocessing, or pyro processing, high-temperature gas reactor fuel reprocessing, and the implications of burner reactors. And that concludes my presentation.

CHAIR PETERSON: Thank you. At this time, we'll enter into the question part of the session, and perhaps I'll go ahead and start off with a couple of questions. The first is for Marissa.

The term safeguards in the United States is used more broadly perhaps than it is in international context because there's both the physical security of facilities and then also there's the application of international safeguards, which are intended to be capable of detecting any attempt to divert material or misuse a facility by the state that has -- that operates it to be potentially used for nuclear weapons.

In the United States, the vast majority of our facilities are not subject to international safeguards, although we offer them because United States is a weapons state. But on the other hand, things that we do here do influence the situation elsewhere in the world.

And so, I -- could you tell me a bit about how the NRC regulates industry compliance with IAEA safeguards requirements, and whether there might be some things that could be done that might improve the situation from the perspective of safeguards approach, and seeing better practices adopted internationally on safeguards?

That would be the international component of safeguards.

MS. BAILEY: Yes. Safeguards is really not my area of expertise, but for the NRC security and safeguards are -- the requirements for security and safeguards are specified in Part 73 and Part 74.

We do interact with IAEA and the international community through the Department of State and other US Government agencies to ensure that we are coordinated in terms of international safeguards.

CHAIR PETERSON: Thank you. In general though, we tend to treat the international safeguards as something that you add on at the end of the process of developing and designing a facility, I think in part because we don't really require that it be considered earlier on. Would that be correct?

MS. BAILEY: I can't comment on that.

CHAIR PETERSON: Okay, okay. Next question I guess would be for all three panelists. The United States currently invests about $500 million per year into DOE NE research intended to develop, improve reactor and fuel cycle technology.

And one of the questions of course is how to best assure that that investment will result in the actual deployment of improved technology, and a piece of that involves of course the need that these technologies ultimately be licensed.

And so, one of the questions is what is the optimal amount of federal funding that should be invested on the DOE NE promotional side, and how much might be optimally invested in the NRC side to perform the anticipatory work that is needed ultimately to license those reactors?

And one of the problems that we face is that the -- some of the issues that one might address, and to provide a specific example you could think about small modular reactors that require control rooms, where you would have some hope that you could have --

you would not need to have independent staffing for each reactor module.

So, this is a type of question actually NRC has been looking at because the answer, once the first vendor gets a license, will become apparent to everybody else, and other people can follow right behind without perhaps having to invest as much effort and time. And that sort of disincentivizes the first company to attempt it in the first place.

On the other hand, NRC actually is aware of these things, but the question would be could one beneficially perhaps invest a bit more resources to NRC so that perhaps there -- you'd be able to get a little bit further ahead on some of these issues, which are unique to advanced reactors, but also are really generic issues that any single vendor is not going to be able to patent the result on? Maybe Mike, if you could answer?

MR. MAYFIELD: Let me first say, I

have the good sense to not comment on DOE's budget. So, let's start there.

In terms of control room design, we have engaged -- NuScale is probably the leading interest in control room design, and reducing staffing desires to have one operator deal with multiple modules.

Our regulations have very explicit guidance on what that means. Regulations are nice. There is a process called an exemptions, so we're not too worried about the regulation. But we have challenged NuScale, as well as the other vendors, that are seeking to make changes to control room staffing.

It's come in and talked to us very specifically about what tasks you need the operators to perform, the timing in which they need to perform those tasks. The vendor contend that their reactors -- and I emphasize this, that the vendor contention we have not yet had our Office of Research do their confirmatory analysis.

So, just to be clear, this is a vendor contention. They contend their reactor systems will respond so slowly that the operators have relatively huge amounts of time to react and perform very simple tasks. Okay, that has yet to be proven. But as we get into this, our Office of Research is conducting research, looking at human performance, the human factors aspect. We're looking at control room design.

The I&C System, the level of automation, is something that we'll have to get into as the vendor begins to specify that. I believe Mr. Lorenzini yesterday said that they expect to have a full simulator available to demonstrate the human performance of control room functions as they would get into licensing.

So, we need to look at the I&C System, look at the level of automation in their plant operation, look at the control room and the task list.

I don't think any of this constitutes fundamental change, fundamental basic research into human performance in control room staffing. Rather, this goes to fairly straightforward implementation of existing regulatory guidance on how you decide on optimum control room staffing.

So, in that sense, well, Dr. Sheron I'm sure can always use more money and staff. The fact is this isolated area is one that is pretty well in hand. We just need to move forward with the vendors and actually engage in their specific proposals.

CHAIR PETERSON: Dick?

MEMBER MESERVE: Good morning. I'm really pleased to have an opportunity to resume a former role where I had a chance to question staff on various issues. You may not relish it.

I'd actually like to follow up on a few things that were touched on a little bit by Per. We heard yesterday about a very major effort that is underway by the American Nuclear Society, where they have looked at a lot of the issues arising out of the Standard Review Plan for small modular reactors.

So, as you're very much aware, over the last year or two, it has been enormous enthusiasm and interest that has been provoked in small modular reactors that really didn't exist before the last couple of years.

I'm curious about whether you've been involved in that effort, the extent to which you're prepared to take that input and engage with it, and sort of how you're -- I mean it's a very major project that's been underway here to try to I think frame issues for you, and I'm curious about what your plans are to be able to use that input.

MR. MAYFIELD: Why, it's -- do you want me to go ahead? All right. Staff from both the Office of Nuclear Regulatory Research and my staff on my program have been engaged with ANS, sitting on some of the specific committees.

We are very aware of what they're doing, and the timing for getting their reports. We're also aware of activities that the Nuclear Energy Institute has ongoing, that are probably in terms of timing and content on a par with those.

We have our own activities underway. The staff prepared a paper that -- the infamous SECY papers that go to the Commission, where we laid out some ten key, what we believed, to be policy issues where the Commission might need to weigh in at some point.

The ANS and the NEI folks have been working those issues at the same time. We are interested in seeing the -- when the ANS papers show up, when the NEI papers show up, the level of content. We have had historically a range of experiences from papers that come in that, "Well, that's nice. There was a lot of thought that went into this, but it's not terribly useful," up to papers where we've managed to put a cover memo on them, and endorse them as staff guidance.

So, there's that full spectrum of history that says, "We just need to wait and see what they actually submit." But we are aware of it. We have staff engaged with ANS in particular. We meet about every six weeks now with the NEI working group members, and go through sort of issue by issue what they're doing.

And so, we are very interested and awaiting that input; however, if those papers turn out to be in the, "That's nice. A lot of good thought, but not terribly useful category," we still will be able to move forward.

So, we have our own activities underway to address those key policy issues that virtually all of the vendors have described in various forms. You get into security control room staffing and emergency preparedness as the three leading contenders among the vendors.

And so, we have activities ongoing with the Office of Research, engaging some of the DOE National Laboratories, to be prepared to look at the input we get from ANS, from NEI, from the vendors, and move forward fairly smartly.

We don't have much choice. We've talked a number of times the issues that are in that SECY paper, there's nothing new. Those issues are at least a decade old. And what we told the Commission last April was the thing that's different this time is we have no choice but to bring them to resolution.

It's not going to be enough this time to simply put forward a policy paper, and the Commission say, "Well, thank you. Go study some more." That's -- we've grown past that. We now simply have to bring these issues to a resolution, present that resolution for post, resolution to the

Commission, and the Commission across the board has said, "We're ready to act on proposals from the staff."

So, it's kind of a long-winded answer to your question. Yes, we're aware, and yes, we're engaged with them, and looking forward to receiving the product.

MEMBER MESERVE: Thank you. I think it really is not often appreciated the extent to which the NRC staff engages with vendors and applicants more generally, long before an application is submitted so that there's early warning and preparation to be able to deal with what's ultimately formally submitted. I have a --

CHAIR DOMENICI: Dick, could you make your last statement again? I could not hear it.

MEMBER MESERVE: Yes. I just said I don't -- I think it is often not appreciated the extent to which the NRC staff engages with potential applicants, long before they have formally filed an application, to make sure that there's common understanding about what the requirements are, what the issues are, so that they can be engaged in an early stage. So that when an application is filed, the NRC's prepared to grapple with it, and not -- and is not waiting to be able to deal with the difficult issues.

We heard yesterday, from one of the speakers in the afternoon, that the fee system was proving to be a disincentive. I think he was thinking particularly about the small reactors.

As you're very much aware, the NRC is -- operates such that 90 percent of its budget is derived from fees that licensees pay to the NRC to pay for its work. And we heard yesterday, that those fees are sufficiently large for some of the small reactors that it was creating a problem in the early stages.

I'm curious about whether you're getting that feedback from applicants. I know no one is ever happy to pay for the fees, but I mean --

MR. MAYFIELD: No one likes the bill collector.

MEMBER MESERVE: I'm trying to get a sense of how big a disincentive you're seeing that being, and whether there's some way to deal with these issues. And that again touches onto a point that Per was raising.

MR. MAYFIELD: We have been hearing pretty much from day one that the fees were a disincentive. Chief Financial Officer and his staff, in conjunction with my staff, and a few others scattered around the agency have been engaged in preparing a SECY paper to propose what to do about fees.

There was a device called an Advanced Notice of Proposed Rule-Making that went out, I think about a year ago, maybe a little longer, that sought input from interested stakeholders on what to do about fees. As you might imagine, the first answer was quit charging them.

Second went to -- from the large reactor guys, "Don't make a change," from the small reactor guys, "Make a change." A lot of specific proposals, and the staff has taken those, and was drafting a proposed paper to go back to the Commission. NEI and the working group have also been putting together a proposal on what to do about fees.

They expect to provide that paper to us in October. So, the staff decided to just hold on to our proposal, rather than give something to the Commission, knowing that the industry in the next couple of months was going to submit something.

We said, "Let's just stop. Put the paper on the shelf, and wait until we get the NEI document, and then we will look at what it says and see if it provides us persuasive thought in advance of us sending forward a proposal to the Commission."

We hope, depending on what we

actually get out of the NEI paper, to be able to put something forward to the Commission by the end of the year. This is a contentious issue. It has nothing whatsoever to do with safety, security, or environmentally responsible use, but it is a compelling issue among the industry, and it is one that the staff is sensitive to.

In putting forward this paper, we were trying to find the optimum way. I guess it was sort of thing where if nobody's happy, you've probably hit about the right answer. So, I'm not sure that anybody would be thrilled with it, but we were trying to hit an appropriate balance between the large reactors paying for the small guys, and the small guys getting charged an unacceptable fee.

That's never an easy task. We're very interested in input from the stakeholders. The paper that would go forward would simply propose something. If the Commission agreed, then it would go into the normal rule-making process. So, stakeholders would have another opportunity to engage and provide input.

So, this is not something that would go to final rule-making, but rather would go into the standard rule-making process.

CHAIR PETERSON: Can I inject just an observation and a question on this specific topic? Since when you start talking about fees, you're getting into the question of whether or not you're incentivizing or not, and the NRC cannot get into the role of --

MR. MAYFIELD: Exactly.

CHAIR PETERSON: -- promoting nuclear energy, which a fee structure that encouraged people to build the first small unit would be one that would come down to zero, pretty close, for the first one in terms of making it much easier to move first. But that really would be a subsidy relative to the actual cost.

MR. MAYFIELD: And we're not -- and we're not headed in that direction. What we're trying to do is find a balance of interests recognizing that accommodating them, incentivizing --

CHAIR PETERSON: Incentivizing.

MR. MAYFIELD: Yes, that's the right word. That is not our role.

CHAIR PETERSON: You cannot do that.

MR. MAYFIELD: That is plainly not our role.

CHAIR PETERSON: Right.

MR. MAYFIELD: What we were trying to is find an equitable balance among the interests that were being put on the table.

CHAIR PETERSON: But that is something that Congress or the DOE could do in terms of trying to make -- come up with an approach that would reduce fees, but that would be an explicit subsidy to first-movers, beyond what would be a reasonable fee from the perspective of cost recovery.

MR. MAYFIELD: And is something where we're not going to weigh in.

MEMBER MESERVE: But let me say that I think there is -- there is a difficult policy issue here in that the first applicant is the one that bears the extraordinary costs if it's paying for the NRC to resolve issues that then the second applicant gets the benefit of, and can free ride on the costs that have been borne by the first applicant. So, I mean this is a tricky issue.

MR. MAYFIELD: This is a tricky issue, and the way we've been taking on the policy issues is those are generic in nature. The ten or so are generic in nature, and they are not being ascribed to -- the fees associated with that are not being ascribed to any particular design or applicant. Rather, they are coming out of the general fund.

MEMBER MESERVE: I have one other question I'd like to direct at Ms. Bailey.

This is a -- there's been some press reports lately about the laser enrichment technology that GE Hitachi is interested in licensing, and I guess as an application that is something you are considering or will be considering shortly. In the -- it's been asserted in the press that the NRC has said that it is not going to examine the proliferation dimensions of that technology.

I would've thought that would've been something that was within the common defense and security obligation of the NRC to evaluate. Maybe just to put safeguards controls on the information, but at least there's been some press report that the NRC staff has said that proliferation is not an issue that it will examine in the context of that License Application, and I wonder if you could give some guidance as to whether these press stories are accurate.

MS. BAILEY: I'm not familiar with the press reports, but I think that within the context of our regulation on proliferation and safeguards, it is something that we would consider in our license review.

MEMBER CARNESALE: Thank you. I have a question for Ms. Bailey to help me. Looking at the last couple of slides at regulatory framework for reprocessing, the very last statement is, "Any research initiatives and plans would be in accordance with policy decisions."

Now, it would seem in general the research would help to inform policy decisions, rather than come after the policy decisions have been made. So, I'm sure this is carefully worded, rather than -- so, I wonder if you could help me understand this a little better.

MS. BAILEY: Yes. I think if that was interpreted, that any research would come after the policy decisions. I mean, that's not 100 percent correct. It's probably a little bit of both.

Right now, the -- there is -- we are, or the Office of Research does have some plans for long-term research for advanced technology for reprocessing, but we are also sitting back and looking at where the nation and the industry might be headed in terms of reprocessing, and what kind of technology that they're looking at.

And so, a lot of the things that we're doing is based on existing technology, but we recognize that to have a flexible regulatory framework, we may need to look at more advanced technologies, but we're waiting a little bit to see where that's going to go. I hope that answers your question.

MEMBER CARNESALE: It does, but my -- not my concern, but it would seem to me that industry is unlikely to take into account some of the things that might be of concern to the nation.

Well, let's take the proliferation. It's unlikely to be as important to them as they would be to you when it comes to licensing. And so, you would think it might be helpful for you to be looking ahead at the kinds of considerations that you would have in licensing or reprocessing for something based on advanced technology that might help guide industry to some extent, as one technology might be preferable to another, for reasons that normally would not go into their considerations.

MS. BAILEY: I agree, and I think as we develop the framework for reprocessing and as we try to identify the types of research that might be necessary and the types of guidance that we might want to put together for a reprocessing facility that that's something that we would try to do to the extent practical.

MEMBER CARNESALE: Thank you.

CHAIR PETERSON: Phil?

MEMBER SHARP: Mr. Chairman, first

of all, I just wanted to say a comment to the many years of public service of these folks, that we owe them a great debt of gratitude in this country.

We're in another one of those cyclical eras where we just simply absolutely trash everybody who does anything on behalf of the American public, and I think we ought to step back every now and then and say part of the reason we have had a good safety record in the nuclear industry is precisely because of the high competence and the focus on safety of the people in this agency historically.

And certainly my interaction in Congress and outside of Congress with the NRC personnel has always given me a greater sense of confidence in that we could count on this system of regulation to help assure us that industry is operating safely with safer culture.

With that said, I want to turn to that issue about the agency itself, of human performance, because you already articulated that one of the key concerns is human performance and the management of our reactors, for example, and the focus on safety culture, which is what INPO does, what you do, what the NRC in regulating these entities.

My question is since we are very reliant for trust on your agency, can you give us any insight into how you as an agency maintain the fervor and the commitment to a safety culture and a high performance, high competence operation?

DR. SHERON: I'll take the first shot, and I'll let some of the other panelists, if they want to chime in on that. I think we -- I think the agency itself is very proud of its safety culture.

I think it emanates from the Commission on down. I know that all of my colleagues, senior managers alike, that's the first and foremost thing is to make sure that we have the right safety culture in the agency.

We promote it extensively. The most recent is now what we call an open, collaborative work environment. We have a website. We encourage our staff to come forward with ideas if they have differing views. All of the managers, myself included, have open-door policy.

We try to interact with our staffs. I have brown-bag lunches at least once a month with my staff, just to hear what's going on, what's bothering them. And I always used to like the term, it's called servant leadership, which is basically my job is to help you do your job to my staff, okay? And if you have a concern, if you have a safety problem, then I've got to deal with it. I've got to help you with that.

I think the whole agency focuses on that, from our Executive Director and the Commissioners right on down. We emphasize it in all hands meetings. We kind of walk the talk, I think. I don't know how else I can really explain it, but as someone that's been there that long, I just feel very comfortable that staff is focused right on safety, and not on anything else.

MEMBER SHARP: I mean, the difficulty is, as you know in human performance, is people get comfortable with how they've been doing things, and their intentions are good, but in fact they let things slip. That's been a historic practice in every institution I've ever been associated with, including my own.

MR. MAYFIELD: There are -- let me come back to that point. We do -- is it two year cycles now? The Office of the Inspector General does a safety culture survey. So there's an independent body that sends a survey out to the staff. We've gone from moderate participation to fairly high participation from the staff on this last one.

The results are provided from the

Commission on down to first level supervisors. We've implemented plans on how you go about improving the areas where we didn't come out as well as we would've liked.

So there is a formal process, and that trickles down to individual staff members at the secretary level, and understand your role in safety and security. So, it is something that is very real within the organization.

One of the -- you mentioned how do you sort of stay vibrant, stay engaged? The -- when we stood up the Office of New Reactors, we were one secretary and nine managers. And we -- in two years, we went to about 490 people. We brought in a lot of people from the outside, and in bringing that body of workforce in, we emphasized safety culture, emphasized their role in the safety review, and assuring safety and security, environmentally responsible use of nuclear power.

When you bring in that many new people, and they weren't all right out of college, these were experienced workers as well as folks right out of college, we didn't have any trouble instilling a safety culture with them. Many of them brought it with them from the nuclear industry.

And so, we've had no problem in having folks perfectly willing to knock on the door and come in and express concern about various aspects of what's going on. So, it's -- with that infusion of new people, it has actually been fairly easy to maintain a fairly engaged staff that are looking for problems.

MEMBER SHARP: Part of the -- obviously, we're not going to get into this issue except for the fact that our capacity, whether as a Commission, as a Congress, as a public to have confidence in this whole system depends on confidence, just the general trust level in your agency, and that's why I just wanted to reinforce that, and both applaud you for it.

Let me just raise one issue. At Davis-Besse, and again, my knowledge is limited, but at Davis-Besse, it appears to be that both the managers of the plant, the civilian, the private sector, did not anticipate the problem and were not on top of it, and nor was the Resident Inspector.

Now, I may be in error about that, but I also hope, or my impression is, the agency quickly stepped in, and I don't know whether your office began any special research on the topic or not, the corrosion.

DR. SHERON: Yes, Dr. Meserve will remember I was kind of heavily involved in that issue. Yes, there were some mistakes made by the NRC. There were some Regional Inspectors that missed some signs that things were not the way they were supposed to. There were clogged filters in the containment. There was an outage in 2000. A photograph was taken which showed --

MEMBER SHARP: I am overstaying my welcome here from my colleagues. We don't need to go back over the accident.

DR. SHERON: No, I just want to --

MEMBER SHARP: Were there corrective actions taken as a consequence? That's what I'm trying to get at.

DR. SHERON: Yes, there were. But I think a lot of it really focused on the fact that if you remember, it ultimately came out that the Department of Justice showed that several individuals lied to the agency.

MEMBER SHARP: Right.

DR. SHERON: And provided us with false information. We made the right decision in terms of going forward with that plan, okay? It was the fact that they were telling us one thing, but were not -- it was not truthful information. We would've made a different decision.

So, I think that while the staff -- there were some mistakes on the part of the staff, there was a big safety culture problem at the plant. My understanding is that has been corrected.

MEMBER MESERVE: They were prosecuted?

MEMBER SHARP: They were prosecuted, the former chairman of the NRC. If I could just make one more comment on the fee situation, which is not totally unrelated to this. I would just caution any desire to make legislative proposals on fees. I wouldn't waste my time.

We instituted those fees, I believe in 1990, Senator, or I can't remember which year it was, and under the desperate effort to balance a budget that was, relative to now, hardly out of balance at all. We used this system to get money to operate a whole series of federal agencies, and I would just suggest to you it's also a guarantee that that budget can be met when you are in the business of whacking down everything in the government, which is where we're going to be for the next five years in super ways.

So, I wouldn't be too quick. You folks have to decide how to allocate the fees, but I'm not sure the industry or anybody else has a big stake in trying to really transform this system.

Maybe I'm defending old baloney. So, I'll be quiet now.

CHAIR PETERSON: Very good. Question from the Senator?

CHAIR DOMENICI: I asked and I would like to talk to you about one question, one observation with you. When Dick and I came out to the -- to your beautiful offices, and we visited you, and we also visited the Commissioners, we were conducting a review then of the NRC licensing process, just from a simple proposition: was it taking too long? And was that length of time it was taking, was it something that we -- that you all were doing, you were causing it for reasons that were not necessary? And we concluded that that was not the case.

But let me tell you when I visited with you, my own reaction with most of your top-notch employees in the Commission, you had been then been energized by the filing of all the applications for new nuclear reactors. And I must say I don't know what you did when we had none because you were so engrossed and involved, I was proud of you.

I thought we really had -- were paying for a group that's really going to do the job of licensing and get some of these applications cleared.

Might I ask, is the process of licensing the group that came together with -- what was it? Sixteen or 17 with 26 different reactors, are they progressing in the normal and expected manner? Brian, might I ask you first? Are those moving along from your standpoint in an appropriate manner?

DR. SHERON: Well, I'm probably

not the right person to answer that.

CHAIR DOMENICI: Who knows?

DR. SHERON: Well, I would have to talk to Mike, if he has any -- because that licensing is done in his office.

CHAIR DOMENICI: We'll have the question answered so we know. None of you want to volunteer your --

MR. MAYFIELD: I will, since that licensing is done in the Office of New Reactors, I get to hear about it fairly frequently. And the answer is yes. As expected, given a first time through the Part 52 process, and for designs that have yet to make it through the certification process.

This is moving forward, I think, as well as can be reasonably expected. I think that all of us, the industry as well as the staff, would've liked for some things to have moved forward a bit better, a little faster, but the fact is given the level of questioning that the applications, some of the new technologies, new approaches to things that are being put forward, I think they are moving forward as reasonably as can be expected.

CHAIR DOMENICI: Well, we -- our information was even though we have 104 reactors, and it seems like we ought to be experienced, it was such a long lag time. New technology and everything else came into play for the 30 years without a new license. This was a brand new experience of significant magnitude, and everybody had to put in a lot of extra time on your side and on the corporation side.

MR. MAYFIELD: Exactly.

CHAIR DOMENICI: But I want to ask about small reactors now that are coming through. Are one of you involved in what's -- how we're going to help --

MR. MAYFIELD: I am, sir.

CHAIR DOMENICI: You are? Is it fair to say that you are being asked to answer questions as to what -- what must be changed to expedite licensing of small reactors? If we look at what your current rules and regulations are, is there some way of making sure they're getting help as to what has to be changed so it can be expedited?

MR. MAYFIELD: Yes, sir. We've done a couple of things. One, we have emphasized to the vendors for the small reactors to pay very close attention to the licensing experience from the large reactors. What things have worked well? What things have not worked very well for them?

And so, we've -- at Commission meeting last April, we went through some of the experiences, the lessons learned from licensing the large reactors, and we emphasized strongly to the vendors for the small reactors to pay attention. Yes, they're different technologies, but pay attention to those things in the licensing process that seemed to delay moving forward.

We have also been asked by the Commission and a lot of interest from the industry in looking at the regulatory guidance, the regulatory framework as to what needs to change and how can we expedite those reviews?

One of the main things we have emphasized to the industry, and -- well, actually and we're undertaking that review and making changes to that guidance. One of the things we have emphasized with the vendors from the very beginning is that the best way to move forward the licensing process is to submit a complete high-quality application to limit the number of times the staff has to come back and request additional information.

That is something that, again, we've learned from the large light water vendors. After a couple of rounds of requests for additional information, it's time to pick up the telephone and arrange a meeting and get the principals in the same room at the same time and talk through these.

That gives the public an opportunity to engage, and it just cuts off this endless round of communication. So, there are some specific things we're doing with guidance. There's some specific things we're doing just with process in interacting with the industry.

CHAIR DOMENICI: Thank you. Thank you, Mr. Chairman.

CHAIR PETERSON: Mike, quick follow on. Could you mention about the composition and role of the ACRS in the licensing process, since people may not be aware of that?

MR. MAYFIELD: The Advisory Committee has a very important role in what we do. They review the environmental statements. They review the environmental reviews. They review the safety reviews.

They go through, and the committee members spend a lot of time reading in advance of the meetings, as well as spending a lot of time with the staff being briefed on specifics of the applications, specifics of the staff's review. Hard spots in particular: areas where the staff and the industry have struggled to reach alignment on that. So they -- and they ask hard questions. This isn't a perfunctory review.

CHAIR PETERSON: And describe who the people are on the ACRS.

MR. MAYFIELD: There are -- the number has gone out --

DR. SHERON: I think there is 12 members right now, and they're usually composed of either retired utility executives, either perhaps retired or even active scientists at National Laboratories, university professors, both retired and active.

CHAIR PETERSON: Very good. Allison?

MEMBER MacFARLANE: Just a quick

question for Ms. Bailey, and maybe Mr. Mayfield. I'm interested, when you go through looking at the reprocessing technology and developing a licensing framework for it, are you going to be consulting with, or using information that other countries have?

You know, Japan went through this recently. They might be a resource. And also with some of the new reactors.

MS. BAILEY: Yes. In fact, last year in the December time frame, we had staff visit the Japanese regulators and utilities to take a look at their regulations for reprocessing, and also to take a look at the operations at Tokai and at Rokasho.

And in September, we are planning a visit to France to talk to the regulators there, and also to talk to the operators at La Hague and MELOX. And I'm sorry; I missed the second part of your question.

MEMBER MacFARLANE: It was about new reactors. The reactors that you're in the process of dealing with here have been licensed and are being built elsewhere, so.

MR. MAYFIELD: Yes and no. In the fast reactor world, yes. And let me come back to the fast reactors. For the small pressurized water reactors, the US is probably the lead in that. The South Koreans have a design similar to the small PWRs, called the SMART Reactor. The Argentineans have a design they are putting forward called CAREM.

We have been -- we have talked with regulators both in Korea and Argentina. I think the Koreans are perfectly content to move forward with the design and ultimately licensing of that design within Korea. They have told us they have no interest in seeking a design certification in the US.

The Argentineans are interested in talking with us because they're still trying to figure out what a prototype licensing process would look like, and that is something we have thought through, and it is embodied in our regulations.

So, we're becoming -- as those designs mature, we are becoming familiar with them, and we are engaged with the regulators on both those countries.

There has been a lot of interest out of the IAEA, their safety standards organization in the standards for small -- well, small modular reactors, pretty much independent of technology. I had been sitting on a committee called the Nuclear Safety Standards Committee that promulgates the standards associated with those. I remember Brian's, one of his managers, now sits on that committee.

So there has been a lot of engagement in those. The fast reactors is an area where we are joined with DOE principally. There is a trilateral agreement with the US, France and Japan, and over the last year, there's been interest in having the regulators from those three countries engaged more directly in that trilateral discussion.

And so, as part of our maintaining awareness, it's to maintain awareness of what the regulators in the other countries are doing. And so we have joined with DOE and are participating in those trilateral discussions.

So the international engagement is actually pretty extensive. The challenge is to keep up with it and not let it become a distraction.

CHAIR PETERSON: I'd like to follow up from a question that Phil had asked earlier related to safety culture. Just to note that if you want to look for independent sort of evaluations, the Union of Concerned Scientists last year issued a report on scientific integrity, entitled, "Freedom to Speak: A Report Card on Federal Agency Media Policies." And this is where the Union of Concerned Scientists conducted an investigation of 15 federal regulatory and science agencies to assess the degree of freedom with which science is communicated at those federal agencies.

And of course, the NRC has its Differing Professional Opinions Program, which also exists within the nuclear industry and provides a mechanism by which people can speak their minds if they have differing opinions. And in fact in that report, the NRC is essentially ranked number 2 within all of those, with the only other federal agency that is ranked higher being the National Science Foundation.

If you think about what that implies, that's actually, it speaks well. But that said -- and EPA. Yes, let's just say that speaks well.

On the other hand, Ed also yesterday raised a criticism which I think is pretty serious. He said that the NRC does not expect new reactors being licensed today to be any safer than those that we built 30-40 years ago.

And I think it's really important to understand whether or not there's some expectation that over time safety should improve for these technologies or not.

MR. MAYFIELD: Unfortunately, there wasn't an opportunity to comment from the audience in rebuttal. The Commission promulgated an Advanced Reactor Policy Statement some years ago, where they plainly stated -- now, they didn't embody it in regulation because you don't need to, but as a policy matter, there's a clear statement that the Commission expects new reactors to be safer than the operating fleet.

Okay, now you get into an expectation of safer versus a change in the regulations. And what we are seeing is that the vendors also expect safer reactors, and you can see that as you look at the Probabilistic Risk Assessments that they are performing and that the staff has been taking a look at.

There is a clear reduction in the calculated risk associated with the new designs. I believe that the industry has stepped forward and is meeting the Commission's expectation for safer designs in the new fleet.

So I disagree with Dr. Lyman's contention.

DR. SHERON: I would just point out my office conducts Probabilistic Risk Assessments, and what we've been seeing, we're doing right now a study called SOARCA, which is the State-of-the-Art Consequence Analysis, and that'll be published roughly in a little less than a year.

Actually, I think it'll be out for public comment, I think by late October -- or no, in December.

What we're finding -- and what that is is a study of, if a severe accident, if a core melt accident were to occur at a nuclear plant, what would the consequences be?

And what we're finding is that we're not really hurting anybody, okay? I mean, there aren't thousands of deaths or anything.

What we're seeing is -- and what we're seeing actually as driving risk now is external events, okay? Like giant earthquakes and everything. And what that tells me is that the industry, okay, over the years has improved the designs of their plants.

They've made changes in their plants. They've made changes in their procedures that have driven the internally generated risk, which is, for example, pumps failing, valves failing, whatever, operators making mistakes.

That's been driven very low so that really what -- what sets the risk for a nuclear plant is externally driven, okay? It's the hurricanes. It's the earthquakes.

And so those are the things we're trying to focus on now to say, "How well can we calculate those risks?" But to me, that tells me that the industry has been actively making the plants safer. Okay? Making changes to the design, adding equipment, finding out where the weaknesses are and fixing them.

CHAIR PETERSON: That makes sense, and the Advanced Reactor Policy Statement I think is important. If possible, could we have that document transmitted to --

MR. MAYFIELD: We will get you the copy --

CHAIR PETERSON: -- the Commission so that we can review it, and get it into the public record?

MR. MAYFIELD: Yes.

CHAIR PETERSON: One question, though. With that policy that new reactor designs should be safer, do we also need to have an expiration date on Design Certifications? In the sense that if you just keep the same certified design for 15 or 30 or 45 or 60 years, at what point should you come back and say, "Why not bring forward a new design?"

MR. MAYFIELD: I think you will find that that becomes a self-limiting problem simply because the technology will move forward, and there will be interest in updating the certified design.

That said, if it's -- and this is where we got when we were looking at license renewal for the existing fleet: if it's safe enough today, and nothing changes, why wouldn't it be safe enough in 20 years?

So, there is a competing interest between continuous improvement versus, if it's safe enough today, assuming you maintain the facility correctly and address aging effects, why wouldn't it be as safe in 20 years?

So there are competing interests, but I submit to you that just the simple economics of, and protecting an asset on the part -- a very expensive asset on the part of the utilities really becomes the driving consideration much more so than us changing something or mandating a change in a regulatory process.

MEMBER MacFARLANE: I just want to, I think, add a clarification. One of the criticisms I understood Ed Lyman to be making yesterday was that given two different reactor designs, and this expectation of greater safety, this policy, if one is significantly safer than the other, and the other meets that level that you are satisfied with, there's no sort of reward. There's sort of a lack of incentive to become even safer, and that's the complaint.

MR. MAYFIELD: Well, again I think it -- and I understand Dr. Lyman's point. The challenge to it comes -- where does the incentive come to drive the calculated risk for your facility down?

There are a number of operational changes that the utilities like to make because it improves cost. It reduces O&M

costs, generally improves operational efficiency. The lower the risk, the more change they get to make without increasing the risk beyond an acceptable level.

So, there is again -- floor is the wrong word -- an acceptable level of safety that's set out in the regulations. And then there are economic reasons, as well as just good policy reasons, to go lower than that.

And so there is an incentive, and it's frankly a cost incentive, not something mandated in a regulation.

CHAIR PETERSON: I think that the timing of the buzzer is just about perfect. Do we have any additional questions from the Subcommittee? In that case, I'd really sincerely like to thank the three panelists today for your participation and the discussion that you provided.

The Subcommittee will be holding additional meetings, and we will be digging into some of the policy-related issues more deeply as we go forward. This really provided a good foundation to understand where things stand today at the NRC. And again I, as Commissioner Sharp said, commend your service and work, and really appreciate the fact that you were willing to come today. Thank you.

We will break for 15 minutes and reconvene at 9:45. And if members of the public are interested in speaking during the public comment period, please sign up outside. There's a sign-up sheet, and this is a good time to get that done.

(Whereupon, the above-entitled matter went off the record at 9:31 a.m. and resumed at 9:46 a.m.)

MR. FRAZIER: Okay, we're going to reconvene. And I'll turn it over to Senator Domenici.

CHAIR DOMENICI: Thank you very much, Mr. Frazier. Can you hear me? Thank you very much. First of all, let me say to the five of you in advance, we aren't sure it's all going to go so great, but we thank you anyway. We love you and we're glad you came. Might as well tell you up front before the testimony.

No, I'm just kidding. This is such a love-in. Everything is going to be great. So panel number 2. Our second panel today is called "Capability Forecasting." That means engineering, manufacturing and construction in operations.

The Commission asked these panelists to focus on the following four questions. I'll go through them very quickly, and then we'll start with you all. One: Is the US prepared to maintain the existing labor force if nuclear power continues to maintain 20 percent of the electrical generation portfolio? What about for an expansion of that?

Two: Does a lack of certain manufacturing capabilities in the US affect our ability to effectively meet generation forecasts? Are these options for the United States to regain or gain leadership in reactor technology manufacturing?

Three: Are government actions required to retool domestic manufacturing or boost skilled labor capabilities to support various reactor and fuel cycle technology options?

Four: Is the pipeline for engineers sufficient to maintain the nuclear industry at current generation levels? And what about an expansion potential?

Our first speaker is Sean McGarvey, Secretary Treasurer for the AFL-CIO Building Trades Department. Would you please proceed? It's great to have you.

MR. MCGARVEY: Thank you.

CHAIR DOMENICI: You have ten minutes, sir.

MR. MCGARVEY: Thank you. And I wish to thank Mr. Domenici and Dr. Peterson and the entire Blue Ribbon Commission on

America's Nuclear Future for extending me this invitation to provide perspective of America's Building Trade Unions on both the role and capacities of the nation's skilled craft workforce and the revitalization of America's nuclear energy industry.

I wish to defer to my co-panelists the question on governmental action needed to rebuild America's domestic manufacturing capacity as well as questions concerning the current and future supply of engineers. Although I will state for the record that America's building trades unions are in strong support of any and all efforts to rebuild a sustainable domestic manufacturing sector that will evolve into an integral source of job growth for American skilled craft workers.

For my part, I will focus today on the issues related to craft workforce projections in association with the expanded nuclear electrical generation portfolio.

First, let me state for the record

that American's building trades unions are extremely pleased that nuclear power is once again widely understood to play an essential and expanded role in America's energy portfolio.

If necessary greenhouse gas reductions are to be achieved, and if we are to lessen our dependence on unsustainable sources of foreign-supplied energy, our unions are determined to assist the industry and the administration to assure that the comeback is a resounding success story, not only for the electrical utility industry but for the nation as a whole.

But there are critical issues that need to be resolved before any of the success can be realized. It is in addressing these issues that the nuclear industry will benefit from having a reliable and effective partner.

Loan guarantees and licensing issues along with the ability to provide the necessary skilled labor to construct the new generation of nuclear power facilities in a manner that keeps costs under control are challenges that can be best met through government, labor and nuclear industry partnership.

Obviously, the availability of the world's safest, most highly trained and productive skilled craft professional workforce is a vital component of the expansion of the nuclear power industry.

Training infrastructure is in place and can be scaled upward to levels of the projected demand based upon current docketed License Applications. The skilled craft training system that our unions operate in the United States is apprenticeship-based and is maintained by labor management contributions.

Approximately $1 billion is spent each year by that system in direct training expenses. When the wages paid to apprentices for on-the-job training wages are included, the total expense for each year is approximately $15 billion.

Our new nuclear power construction labor agreement has a training framework that is built on that apprenticeship system, and to it the agreement adds important enhancements necessary to achieve the level of specialized training required in the exacting nuclear construction industry.

For example, the agreement includes unprecedented language that would allow for labor shortages in one craft to be filled with workers from another craft or from any other credible source.

Further, the agreement contains language allowing 100 percent portability for outage work for the same owner in order to meet short term demands such as outages. The agreement additionally provides for the use of apprenticeship, apprentices, and other sub-journeyman classifications in order to contain unit costs to encourage efficient crew composition.

And finally, the agreement establishes an extraordinary commitment to the development of on-site or near-site multi-craft training facilities to ensure the safe supply of skilled workers to provide specialized training for journeyman and/or apprentices, or to be used by vendors to train and certify workers on the installation of specialized equipment.

These facilities can also be used to provide career development to workers recruited from the communities by the owner for operations and maintenance positions necessary to operate and maintain the facility once -- the facility upon completion.

On the labor demands side, according to 2009 analysis on design and construction conducted by Bechtel Power Corporation for Bipartisan Commission led by Senator Domenici, in which the building trades participated, roughly 4,000 skilled craft professionals will be required at peak construction for a new nuclear power plant generating 1600 megawatts of electricity.

There are, according to the Department of Energy, 17 combined operating license applications embodying the construction of 26 new reactor facilities that will have been docketed with the Nuclear Regulatory Commission. Accordingly, over 100,000 skilled craft professional who are trained and certified for nuclear construction work will be required to address the manpower needs posed by these projects currently on the NRC docket.

The report to which I refer benefitted greatly from Senator Domenici's personal leadership and was completed in 2009 by the National Commission on Energy Policies Task Force on America's Future Energy Jobs, in which, as I indicated, the building trades participated.

Among the report's recommendations

were the following: Built upon existing programs including joint labor management apprenticeship programs, clarify and streamline support for apprenticeships, technical certifications and on-the-job training for veterans by combining the benefits of the post-9/11 GI Bill and the Montgomery GI Bill into one program; communicating that skilled trades are a vital component of the American economy and should be viewed as desirable options for individuals seeking career training.

Encourage the development of accredited, credential-focused programs that put individuals on a long-term career track, programs that should allow transferability of credits throughout the industry and should develop skills that translate from one program to the next. Programs should issue stackable credentials that allow individuals to develop the building blocks of a career in the energy sector.

Accumulating a pool of highly skilled, highly valued and qualified construction workers needed to build nuclear units and maintain them will no doubt be a challenge, especially in light of the fact that qualified boilermakers, millwrights, pipefitters, electricians, and ironworkers are expected to be in short supply in some local labor markets.

The use of workers from other communities and states, travelers, as they're known in our industry, will no doubt be an important component in addressing the project manpower needs for the nuclear buildout.

These and other factors beg the question as to whether or not American's building trades unions have the capacity to meet this demand. And the answer is a resounding yes. We do have the capacity to meet this demand, and yes, as evidenced from our new nuclear power construction agreement, we also are looking at innovative ways to supplement our current and future capacity in order to address various isolated issues associated with demographics and geography.

For example, thinking innovatively and strategically about the necessary steps needed to ensure the development of safe, productive and qualified workforce in areas that are remote and thinly populated. In general, American's building trades unions, in conjunction with our signatory contractors, operate the largest and most effective skilled craft training apparatus in the world.

We have well-equipped training facilities in every medium to large city in the country and it is important to note, in these days of budgetary concerns, our training infrastructure is self-supporting and self-sustaining. It's not federally funded or state funded.

Today, our training capacity is significantly underutilized. That is mostly the byproduct of the current economic depression in the construction industry. But even in tight labor markets, our training capacity has been underutilized.

Currently, the biggest problem that we face is on the demand side. The current depression, and I use the term depression, not recession, because when you have 20 percent unemployment in the construction industry today, that is a depression, is putting us in danger of losing many of our best and brightest to other careers and industries.

And that encompasses not only skilled construction workers but the qualified instructors and trainers that train our apprentices and upgrade the skills of our journeyman.

So, the question is not whether American's building trades unions have the capacity to meet the needs of the burgeoning nuclear industry. We do. The question is whether we have the national will to take the necessary steps to quickly move forward with the national agenda that places a priority on the revitalization of our nation's portfolio of clean power generation sources, including not only nuclear power but facilitating and utilizing modern coal technology and renewable energy sources.

I thank you once again for the opportunity to provide this perspective. Thank you.

CHAIR DOMENICI: Sean, thank you. Thank you very much. Let me say from this senator's standpoint, it's been a pleasure working with all of you on the loan guarantee programs and those other areas where we've been trying to move the applicants and licensees along.

In that work, we were able to see how the AFL-CIO had terrific programs to train the people for a new power plant. The problem is we can't get the power plant started on time, and we can't get enough of them going in the United States because of -- for economic reasons. But there's no better source of training than the contracts they enter into with you training the people.

Great jobs, high-paying, and you don't worry about the fact that everybody's not getting a college degree. You're saying, here's $25-$30 an hour jobs. If we can teach them and make them permanent, we're glad to be part of that Middle Class America. That's what you all say, and I do compliment you for it. I think it's absolutely right.

MR. MCGARVEY: Thanks.

CHAIR DOMENICI: Let's move ahead. Our next one is Ms. Carol Berrigan, Senior Director of the Industry Infrastructure and Vice President of the Center for Energy Workforce Development of the Nuclear Energy Institute, NEI. Carol, would you proceed? Ten minutes.

MS. BERRIGAN: Chairmen Domenici and Peterson, and distinguished members of this Subcommittee, my name is Carol Berrigan, and I am the Senior Director for Industry Infrastructure and Supply Chain at the Nuclear Energy Institute.

Thank you very much for this invitation to speak with you today about the availability of the future skilled workforce and manufacturing capacity necessary to support the continued operation and expansion of commercial nuclear energy generation in the United States.

The nuclear industry faces several challenges in meeting its future workforce demands and reinvigorating the domestic nuclear manufacturing base. Chief among these challenges is the lack of a durable national energy policy that creates an environment in which long-term investment in energy infrastructure is encouraged.

Due to the long lead times and level of investment necessary for nuclear project development, adherence to a consistent long-term policy is critical.

Despite this, the commercial nuclear industry has taken aggressive action to create an infrastructure through which the next generation nuclear workforce will be trained and has implemented a program to expand the domestic manufacturing base.

Since the interest of this Subcommittee is the forecasted availability of the nation's skilled workforce and manufacturing capacity, I will begin with describing the size of the workforce needed to support the current nuclear industry and new nuclear construction.

Each nuclear reactor in operation today directly employs 400 to 700 people. In addition to direct employment, the nuclear industry relies on numerous vendors and specialty contractors for additional expertise and services.

In total, NEI estimates there are approximately 120,000 workers employed in all sectors of the commercial nuclear industry in the United States.

NEI's 2009 workforce survey indicated that 38 percent of current nuclear utility employees will be eligible to retire within five years. In addition, the industry continues to experience non-retirement attrition, which over the same period will require replacement of approximately 10 percent of the workforce.

The resurgence of nuclear energy will lead to increasing demand for skilled labor at all levels. According to an analysis by the National Commission on Energy Policy, the development of a nuclear power plant project will require 14,360 man-years per gigawatt installed.

If nuclear energy generation continues to provide 20 percent of the nation's electricity supply, this will require construction of roughly 20 to 25 new nuclear units by about 2030. If the industry were to construct these units, it would require between 287,000 and 360,000 man-years of labor.

Once built, these plants would require 8,000 to 17,500 permanent full-time workers to operate the plants, and additional supplemental labor for maintenance and outages.

Let's see. The commercial nuclear industry has undertaken a systematic program to create and reinforce the infrastructure needed to develop the next-generation nuclear workforce. As an industry, we are hiring. Over 9,600 individuals were hired into the industry in 2009.

The infrastructure was developed to meet the future staffing needs of the fleet of 104 commercial nuclear reactors currently in operation, but was designed to be scalable so that it could be expanded to meet future workforce demands of new nuclear units as they are constructed.

In addition to ongoing support for nuclear engineering, university programs and their related infrastructure, the industry has centered on the development of the nuclear uniform curriculum program. This program is a systematic approach that utilizes community colleges in key locations to deploy an industry-recognized standard curriculum structured to meet the industry's needs for new workers in key disciplines.

The Nuclear Uniform Curriculum Program has three components: quantifying the industry's needs and supply of graduates from partner programs, defining the curriculum and implementing the appropriate number of programs on a regional basis.

Currently, there are 43 community colleges throughout the country that are part of this program. They offer courses in radiation protection, operations, electrical, mechanical and instrumentation control maintenance and chemistry.

In the 30-year period since 1980, the US nuclear supply chain has contracted due to a lack of new nuclear plant construction in the United States and abroad. Thanks to nuclear energy expansion currently underway and on the horizon, the United States has a unique opportunity to rejuvenate the US nuclear manufacturing sector through investment in state-of-the-art factories and facilities, and processes to supply the high-precision, high-quality components demanded of nuclear technologies.

Today, there are 60 nuclear power plants under construction around the world. In addition, there are 149 plants on order and 344 projects under consideration. This represents a significant opportunity for US-based suppliers and some have begun responding by adding staff capacity and developing additional manufacturing facilities.

Over the past few years, we have seen a significant increase in the number of domestic nuclear suppliers. ASME Section 3 Nuclear Certificates, commonly called N-stamps, held in the United States have increased 34 percent since the beginning of 2007.

Currently, 46 percent of all N-stamps are held in the United States. Demand for high-quality commodities, components and services provides an important opportunity for US manufacturers. The Nuclear Energy Institute estimates that the world market represents potentially orders of over $400 billion in equipment and services over the next 15 years.

As a rule of thumb, the Department of Commerce's estimates indicate that for every $1 billion of exports by US companies represents somewhere between 5,000 and 10,000 jobs domestically.

Due to their size and complexity, nuclear plants create a broad range of domestic manufacturing and export opportunities. For example, depending on the design, a single new nuclear plant requires approximately 500 to 3,000 nuclear grade valves, 125 to 250 pumps, 44 miles of piping, 300 miles of electrical wiring, and 90,000 additional electrical components.

NEI has gathered information from companies managing three of the five lead projects here domestically, and our survey shows that three of the lead projects will obtain between 60 and 80 percent of components, commodities and services from US firms.

Three of the five lead plants, more than 2 billion of equipment and services, have already been procured from US companies in 17 states, and three of the five design-centered project teams have set procurement and labor goals of between 75 and 90 percent US content and are on the way to achieving these goals.

Beyond the development and

adherence to a durable long-term energy policy, there are several areas where the US government can assist in the expansion of the workforce and reinvigoration of the supply chain.

Robust administration support for the expansion of nuclear energy domestically is required, as well as a consistent policy to support the export of nuclear products and services. Investment and research for the next generation of new technologies will further open opportunities for American companies to take back technological leadership.

As with the current generation of reactors, though, success will require political support, consistent policy and a willingness to address international barriers to trade.

The federal government should renew and expand the 48C tax credit made available in the American Recovery and

Reinvestment Act. This credit will help US industry invest in the development and upgrade of nuclear manufacturing facilities.

Continued federal support of nuclear workforce programs and tax incentives for worker training are needed. The integrated university program at the Department of Energy and the Nuclear Regulatory Commission should be continued. This program is helping to effectively educate technicians and professionals for careers in all sectors of nuclear science and technology.

In addition, federal support for research reactor infrastructure and the Advanced Test Reactor National Scientific User Facility at Idaho National Labs should be continued. The federal government should provide tax credits for the expenses of training workers for nuclear power plants and facilities producing components for fuel for such plants.

This credit would serve to

accelerate hiring and allow industry to utilize a broader range of workforce training solutions, including apprenticeship programs, community-college-based education programs and specialized technical training not currently available at public educational institutions.

In closing, the development of the future nuclear workforce and reinvigoration of the domestic manufacturing base have long lead times and require adherence to a consistent long-term policy that supports the expansion of nuclear energy domestically and the export of nuclear products and services.

Success in this area represents a tremendous potential for the US nuclear industry and for the American worker. I appreciate this opportunity to speak with you today on these important issues. I would be pleased to answer any questions that you may have.

CHAIR DOMENICI: Our next speaker is Dr. Henry Cialone, President and Chief

Executive Officer of the Edison Welding Institute.

DR. CIALONE: Good morning, Co-Chairs Domenici and Peterson and Members of the Commission. I appreciate this opportunity to come talk to you.

EWI, located in Columbus, Ohio, works with manufacturers in all sectors of industry, from aerospace and automotive to consumer products and shipbuilding, to help them be more competitive through the use of advanced manufacturing technologies.

So, my comments will come from the perspective of technology. Two years ago, EWI created the Nuclear Fabrication Consortium to advance new nuclear fabrication technology that helps its members to support the domestic and international nuclear markets.

So, in response to your first question about capacity, I think there are three forces that act here. One is believable demand. Industry can respond to a demand.

They need to know that it's going to be real. They need to know when it's coming.

Many of the members of our Consortium formerly were N-stamp certified. They aren't today, and they're waiting on the sidelines to see is this is really going to happen and when. Because when you look at a return on investment analysis, one of the biggest factors is time. What's the delta-T for when cash comes back?

Second is, competition from other employers. What other industries are going to be building things? If we look out ahead, we do a lot of work with pipeline construction companies. They're projecting an increase in demand. They're concerned about the availability of workforce in the next five years or so. And so that's going to be one of the factors as well.

Third is technology. Can you get more from existing workforce through the introduction of technology? And that's the kind of thing that we do for a lot of our customers.

We have worked with the US Navy on what's called the ManTech Program, which continuously brings forward manufacturing technologies that reduce cost and increase quality.

So, as an example, the Navy Joining Center, which we operate, is currently working on a project to replace conventional arc welding with mechanized tandem gas metal arc welding to increase productivity by 200 to 300 percent. That has a huge impact on the number of man-hours it takes to build an aircraft carrier, for example.

Another example involves a fabrication of submarine structural components. Component was fabricated ten times faster by transitioning proven technologies from the automotives side of the house to the Navy shipyard.

So, I guess the short answer to

the question about capacity is it depends. Is the demand going to be there? Is it believable? Are there other industries that are going to have comparable growth and demand in the same time frame? And are there new technologies that are going to be brought forward to help to meet that demand with the existing workforce?

Second question, capability: Really all the manufacturing capabilities that are needed to build a nuclear reactor exist in the US today. The one that's missing is ultra-heavy forgings.

We believe there are ways to address this. One might be to modify the design of next-generation reactors, alternatively implementing new manufacturing and welding techniques that would enable fabrication instead of forging to the same complex components.

If you could just allow six additional welds in pressure vessel heads, current forging capabilities in the US would be adequate to meet the need. Now, the challenge there is inspection.

Well, there are new inspection technologies that have been developed over the years. To name two that I think really should be looked at, one is digital radiography: much more accurate, much more detailed. You can see and you can size defects, and the challenge in inspection is not only finding a defect, but knowing what size it is and where it is exactly.

The other is matrix phased-array ultrasonics. These were both developed dramatically over the last decade or so in other applications. They should be looked at to port them over.

But the other is, why not build the capacity in the US? We've seen rough estimates to build a heavy forge, acquire the special handling equipment, build the building to house all this, ranging from $200 million for a retrofit to $1 billion for a greenfield site. Relative to the cost of building a nuclear plant, that's not a lot of money.

Third question, government's role. So government's role is reducing technical risk and your industry deals with commercial risk. And I think government can enable the introduction of new technologies.

I mentioned the ManTech program. That's something that the Navy and the Air Force do. They get a lot of value out of that in helping to continue to extend existing platforms and to build new platforms efficiently.

A ManTech program for reactor construction would focus on high-quality, high-productivity technologies. At the same time, the government could engage community college systems and universities to prepare the workforce to implement these new technologies.

I'm going to defer the question on

engineers in the pipeline. I think Carol has already addressed that. But in terms of wrapping up recommendations, I don't think the sky is falling. I think there is an opportunity here, okay?

We've heard from several of our NFC members that while domestic manufacturing capacity must be addressed, it's also vital that there be a focus on transitioning these technologies from the lab to US manufacturers, and I think that has always been a gap in the US. We create new things, and we don't think about how to get it into the hands of manufacturers.

Looking to the existing portfolio of the national labs, a lot of great new technologies, but nobody is thinking about how do we actually build something out of this.

So, one thought would be, why not create a lab for transitioning technology: something that focuses on the manufacturing challenges of taking new designs and new concepts and putting them out in the field, demonstrating them at scale so that people can have confidence that this actually works before you actually go out and build something.

Why a lab rather than just a ManTech program, which is what the Department of Defense does? Well, one of the big challenges in introducing new technology in this space is regulatory acceptance.

When you've got NRC leveraging the standards bodies like ASME, you need someone who can engage with them, and I think a laboratory could provide this function.

The other suggestion is repurposing existing assets. We talked earlier about the ultra-heavy forgings. There's a lot of restructuring going on, and there are a lot of assets, both human and physical, that are available, or coming available.

One example that comes to mind is

Northrop Grumman's Avondale facility, shipbuilding facility, in New Orleans. It'll be closing down in 2013. They've got 5,000 skilled employees there. There are metal workers, welders, pipefitters, electricians, a whole bunch of specialty jobs, a lot of the same specialties that would be needed to build nuclear components.

A huge site. It's on water. Easy to barge product to an end customer. The level of expertise is very high. There's a lot of sophisticated work going on there as well. I'm sure there would need to be some retraining, but it wouldn't be a very long putt.

Why not convert that to the ultra-heavy forging capacity that's needed in the country? And that's just one facility. There are lots of others. And so I think we need to take a look at it systematically and figure out what are the opportunities there, and take advantage of them. So that's another role that government could play.

So, in summary, I think there needs to be a plan to take advantage of the opportunities. Create alignment. Connect the dots. Identify and address overarching needs in this reemerging industry sector. I think, as I said, it's a great opportunity. Thank you.

CHAIR DOMENICI: Thank you very much, Doctor. Our next speaker is John Gutteridge, Manager of Nuclear Education Programs at the Nuclear Regulatory Commission. Welcome.

MR. GUTTERIDGE: Thank you, Senator Domenici, Dr. Peterson, Commissioners. I spent 34 years at the Department of Energy and the last three years at the NRC, about the last ten years doing nuclear education.

As all of you know, the 1960s and 1980s were heyday for nuclear. We had 64 research reactors, over 50 nuclear engineering programs, 1,800 -- more than 1,800 students, and we were ordering and building nuclear power plants.

However, things happened with the accidents during the late `70s and early -- mid `80s. The plight of nuclear engineering education was acknowledged. We have the Chairman of this Nuclear Engineering and Education Cause for Concerns sitting in the audience, Tom Isaacs. I served on that panel in Paris for the latter two years of the 20th century.

There's a seminal document in that it got the world and the US acknowledging that we had a problem in nuclear engineering. And after that, the DOE programs developed very rapidly.

This is a timeline chart that shows you the programs that DOE and NRC have implemented over the years. Some of these still exist. Some do not. I can't discuss all of them here, because they're obviously very numerous.

So what happened? In the `90s to 2006, the university programs at DOE grew very rapidly from 3 million to 30 million. DOE decided in `06-`07 to suspend the program. Congress decided that the program needed to continue. Actually, Senator Domenici was part of that in the mid-2000s, and transferred part of it to the NRC, the part that the NRC could do without impacting their licensing aspects, and DOE restarted their program in 2009.

The current NRC program is authorized in the Energy Policy Act of 2005, beginning in 2007 with curriculum development program, $5 million. And a year or so later in 2008, Congress authorized the rest of the program with $15 million.

I'll tell you what's in that program, but the one thing that is key is it went to related trades as well, not just four-year institutions. The grant specifics are listed here: scholarships, fellowships, curriculum development, faculty development and creating community college scholarships.

You can see the amounts that we allow, and the years that we allow them to occur. And it's been a very successful program so far.

The one thing that is unique about the NRC program, versus some scholarships given out by DOE and others, is we have a service agreement, and this serves to focus the students before they accept the scholarship or fellowship to acknowledge that they need to serve at least six months in the nuclear industry for every year or partial year of support. And failure to comply with this is very costly, because they need to pay back the money that NRC has forwarded to them.

This gives you an indication of the states and the territories that have received the grants. Actually, it's very widespread over the years. This shows you the enrollment trends, which the dark blue is graduate. The light blue is undergraduate.

Now, if we went back before 2004, back to the late `90s, you'd have about 600, and now you have 4,750.

This is probably too small for most of you to read, but it shows each school that's involved, the light blue being graduate students, the red being undergraduate students, and the other two being people who have graduated from a graduate program and from an undergraduate program.

The top one there is always Texas A&M. It'll probably always remain that way. The ones below that shift from year to year. But you can get the impression that there is about the top ten schools that educate our nuclear engineers.

So NRC supports over 500 students annually at 108 institutions over the last four years. Right now, we're emphasizing trade schools, community colleges, two-year programs, minority-serving institutions, and health, physics and radiochemistry. The NE programs seem to be doing quite well.

We do encourage leveraging and partnering. In fact, of the $20 million we gave out last year, $10 million of that was leveraged.

What is working? The population is growing, the student population, perhaps even too fast, as I'll get to in a second. New university nuclear programs are beginning throughout the country. Our funds are leveraged, which is nice to know.

Partnering is occurring not only among schools, but also with utilities in schools, and it has increased interest in our trade schools, community colleges. The first year we offered the scholarship, we had seven applicants. Last year we had 19. All were funded, by the way.

Our applications far exceed our available funds. Although all the trade schools are funded, only about a third of the four-year institutions are funded -- of the applications.

The greatest near-term workforce needs appear to be trade and crafts. At this moment, outreach to pre-college students is absolutely necessary. It was a big part of the DOE program. Right now, not much is being done in that area, either by NRC or DOE. And unfortunately or fortunately, success may depend for the foreseeable future on continued government support of nuclear education.

What hurdles do we have? We need to better understand the workforce in terms of personnel and the physical infrastructure needs. We do not have a good handle on that. That has been attempted over the past ten years and we have not succeeded.

The NRC program has a limited scope and flexibility. We are basically stovepiped into the four or five disciplines we've supporting. It's very difficult to support things that come up that are of interest to us, which we were able to do in the DOE at the time.

There's always annual funding uncertainty. The DOE program is usually funded; 20 percent of the research dollars. The NRC program is usually fought over among the Commission, OMB and the Congress.

We have a lot of duplication of effort going on, and we're going to try to avoid that in the future, and the outreach is very important. I'll give you an example of outreach in this next slide.

While we were at DOE, we felt that we needed to educate high school students about nuclear engineering and energy in general. We came up with The Harnessed Atom, which is a high school honors edition that is taught to 10th, 11th and 12th graders and gets them interested, and they get to visit a nearby research reactor, and it has been implemented in several locations around the country. Massachusetts: MIT deals with Brookline. North Carolina State deals with

Wade County in North Carolina, and other places.

The -- I believe the Federal Nuclear Education Program appears to be developing a sufficient pipeline of personnel. Funding continuity does instill confidence in federal commitments to nuclear education.

When the DOE had the hiccup in `06-`07, a lot of the schools were saying, "If the government is really not interested in supporting education, then we need to back off a little bit ourselves."

Absent retirements and new builds though, we seem to be -- we might be incurring an oversupply in some areas. Visiting various schools recently, I found a lot of very high-caliber students, and in some Texas schools, that couldn't find employment.

We also had a recent call from a two-year institution that said they didn't need any money this year because they can't place their current graduates. So that might be a problem. I've never heard of that prior to this year.

There is a supply and demand survey being conducted by the DOE. It's supposed to be out in October. I think it may be delayed a bit, but they are going to try to quantify what's needed in radiochemistry, health physics and nuclear engineering, and see what the supply and demand is so we don't overeducate in the wrong areas. Thank you very much.

CHAIR DOMENICI: Thank you very much. Our last speaker is James Stouch, Vice President of Business Development for Precision Customs Components, LLC, of York, Pennsylvania. I assume you're part of that business, sir?

MR. STOUCH: Yes. That's correct.

CHAIR DOMENICI: You own part of it?

MR. STOUCH: I own a piece of it, yes.

CHAIR DOMENICI: Fine. We're glad to have a businessman here.

MR. STOUCH. Very good, thank you, and I enjoy the opportunity to present some remarks today from the perspective of a manufacturer. I appreciate your time, Senator Domenici, Dr. Peterson, and the rest of the Subcommittee.

It is the perspective of a manufacturer that I bring today. We are located just 80 miles north of here, and I would extend an invitation to any member of the Commission at any time, together or separately, to visit us and see how we do things.

We are an original Rickover-era supplier, as S. Morgan Smith Company, and then Allis-Chalmers nuclear, and today privately held Precision Custom Components. Our history is deep in both the Navy and the civilian nuclear program. We manufactured the first reactor vessel internals for Shippingport 1, the first commercial nuclear plant in the country.

Today, Babcock & Wilcox and our company are the only remaining manufacturers who have manufactured reactor pressure vessels of steam generators in the United States.

I'm accompanied by 275 teammates that include in our shop labor force the International Association of Machinists and Aerospace Workers, Local 1403, and fortunately we have shared in the nuclear renaissance to date, having won some business from both Curtiss- Wright and Westinghouse, and are supplying some reactor vessel internals and other primary coolant pump components, and other reactor-related components for the two plants in China, as well as Vogtle, the two units at Vogtle in Georgia, the two SCANA units at V.C. Summer in South Carolina, and even a couple of components for Progress Energy's Levy County Plant in Florida that is currently in suspension.

Commercial nuclear power, obviously, given its ups and downs, is not our only business line. We do manufacture pressure vessels for other energy sectors, as well as engage in the Navy nuclear program and other shipbuilding programs for DOE and DOD, as well as the MOX program, its dockside fuel fabrication facility, and the NGNP with DOE and some NASA work as well.

A component of our history also in the energy business includes the fact that we built the original hydroturbines for Hoover Dam in our plant. So we've been involved a long time, have maintained an N-stamp for decades, and are proud of that.

I'm going to pass through the next couple of slides in the interest of time, and allow those to stand in the record, but basically as we understand, even when we take account of the increased demand for electricity, even accounting for -- I saw a number recently of a 5 percent reduction in demand growth, but we account for a climate change as a societal issue to increase the need for base-load carbon-free generation.

Challenges with financing, transmission grid capacity, all of that, the bottom line is there will probably be a need worldwide for new nuclear capacity. So the balance of my remarks are getting back to the agenda, first to deal with the human resource component from the standpoint of labor, engineering and the like.

First of all, I'd like to calibrate this kind of discussion. The fact that back in the 1950s, we didn't know how to do any of this, and we figured it out: developed the designs, trained the workforce, adapted our manufacturing practices and capabilities, and we figured it out.

And there were bumps along the road: issues with materials and corrosion and joining technologies and design and the like. Today, in addition to that, we have a current staff, as I mentioned, of 275. We had as many as 850 employees at our site. The way we're facilitized today, we could probably double our current numbers.

So, we have the space and the machine capacity to do this. We've helped ourselves as well. About six years ago, we reinstituted our apprenticeship program. That is a four-year program to enable machinists to come out of that program with a state certificate as a journeyman machinist.

Hopefully, they will never leave PCC, but nonetheless, it is transportable. In addition to that, we work locally with the Advanced Skill Center, which is a 501(3)(c) organization, to pull pre-trained individuals for our welding and fabricating capability.

So there are some existing programs in place, and there is capacity to build from there.

We tend to concentrate, when we talk about engineering graduates, on nuclear engineering an the nuclear science programs. I know from our perspective, we've hired over the last couple of years some very good recent grads from Penn State and other quality institutions in mechanical engineering, manufacturing and industrial engineering.

There are those disciplines from the manufacturing perspective that should not fall off the table and be included into the discussion, along with nuclear engineering and nuclear sciences: metallurgists, welding engineering, metallurgical engineering, mechanical, industrial and manufacturing engineering as well.

Dr. Cialone touched on this, but just one caution in this: while my message is one of yes, we have available capacity, I believe we can -- we have the manpower and training capability and capacity to take care of 20 to 25 units by -- in the next 20 years or so.

But 2007, we don't have to look

too far back to get to the point where a number of our market segments were all on overdrive. And we can argue about, was that artificially supported or not? But we had $130 a barrel oil that gave other energy sectors a lot of creative ideas to expand plant and equipment.

We didn't have as much concern over CO2 emissions at that time and I bet every other week we received an RFP for some major pressure vessel work to support coal gasification plants, which does not exist today in as nearly a big a way.

So there have been capacity constraints when we overlaid strong economy and strengthen all market segments. That doesn't happen very often. I wish it would happen more, but it doesn't, and that's the only caveat I issue relative to the -- my message of the fact that we have lots of capacity in terms of human resources.

Let me address now the

infrastructure issue in manufacturing capability and capacity. A lot of the discussion in this arena typically grounds out on ultra-large forgings. The ultra-heavy forgings, obviously the pathway goes through to Japan and France today.

However, we have announced ultra-heavy forging facilities in Korea, China, India, Russia and the UK. If they're all built, there's probably, at least when you add the numbers together, enough ultra-heavy forging capacity in the world to move forward with the plants that we perceive today.

Now, if we look at those countries, not all of them are friendly to us. The reason they're engaging in this is because they have their own program. And so, would we be a priority?

We do have a make-versus-buy-question in essence ahead of us. Certainly Senator Voinovich and others have been vocal in terms of trying to instigate an ultra-heavy forging facility here, but it's not just the forge. It's the ability to melt the ingot and produce the steel and the like.

The question at the bottom line is, where is the market? And do we want to make those here? The balance of the components, and most of them, can be made here in the United States, particular small modular reactor components. They can all be manufactured here. And I daresay there is likely capacity or can be capacity.

A number of us -- you know, PCC is a small business. We typically talk in terms of Shaw and their modular construction facility. We talk of Northrop Grumman and their facility in Newport News. But the likes of PCC, American Tank and Fab in Ohio, Oregon Ironworks and Oregon Premier in Idaho, Rainier in Massachusetts, Petersen in Utah, a number around the country that are all small businesses; we've got our own money at risk, and most of us have stepped forward and built some additional space and/or capability in order to meet the nuclear renaissance, which has been slower than we all expected getting off the dime.

And so it is a small business issue that provides jobs and will help sustain and meet the need for the industry.

Lastly, the comments on government actions, certainly expansion of the loan guarantees: build it and they will come. We have the capacity. We have the creativity. We can get it done. Ultra-heavy forgings, we have to figure out what we want to be there, as a nation.

One of the things that doesn't get a lot of press, but the reason why those of us with N-stamps still exist and/or the capability and capacity, is the fact that we have adapted to other markets. Among those have been the Navy Nuclear Program, the shipbuilding program, the DOE programs and the like.

It's a common supply base, the common capabilities, and of course DOE, from a standpoint of providing an academic base to move forward. So, continued support to base-load the industry and the manufacturing industry.

If we have demand, then we need to expand, certainly, and we will do what we say we will do, and I believe we can do. And in that case, then, certainly, investment tax credit help and some training partnerships and the like would facilitate that.

Finally, we're not afraid to compete. We have exported components to Japan. We are exporting through Westinghouse components to China. And all we ask for is a level playing field. I need a license from DOE, a license from NRC, agreement at the nation level through the Department of State.

Then I need to get a certification in the country to which I'm exporting, and those requirements on the other end are government-generated rather than private sector and market-generated. And so all we ask for is a level playing field in order to compete, and the imports coming the other way as well.

I appreciate the opportunity to present these remarks today and welcome questions.

CHAIR DOMENICI: We appreciate having you. Thank you very much. Thanks to the entire panel. Now, I'm going to yield to Per, who is going to lead off the questions. Thank you again.

CHAIR PETERSON: If I can, I'll start with questions, and then others will have questions, if we could. So, the first thing that I'd like to point out is that we're interested, I think primarily, in trying to project where nuclear power might be going in the next few to several decades because that is germane to the question of how we manage the back end of the fuel cycle, which is the

Commission's charter.

So the issues being discussed today clearly will play a substantial role in what that trajectory might be, and one of the major issues with workforce is associated with demographics.

Now I think, Carol, you showed a plot, which showed a bit of a skew towards more gray hair, I guess. Right? So -- and there are active efforts to bring new people in. They tend to be young.

I'd be curious from each of these major elements of the labor force that are important: skilled trades, manufacturing. I know a bit about the education part, but I'll ask John to comment on that. What are the implications of having essentially a gap in the age range, and are there places where we can fill that in?

In other words, are there places where we can bring in talented people from other backgrounds, who can fill in, for example, in sort of the mid-level management range or the supervisor range, or basically that middle age range. I'd just like to hear about what's going on in each of these major labor force areas. Maybe Sean?

MR. MCGARVEY: On the -- on the craft side, apprenticeship programs run, depending on craft, three to five years. But I think anybody that's in the industry will say to be a real well-rounded what we call mechanic, somebody that possesses the skill sets to work on just about any kind of application, needs -- he or she needs to be in the field practicing their craft six, seven, eight years until they're really a top-quality mechanic, which then moves them into the opportunity to be in a supervisory position, whether it's foreman, general foreman, superintendent.

So, I don't think the gap between --the average age for our folks is in the middle 40s, which is problematic for a whole

bunch of reasons, pension funding and others -
- doesn't lessen the skill sets that you
described.

But I think that the real problem that we face and have faced: we worked for -- I just came back from a meeting in Panama City with Southeastern Manpower Tripartite Committee, where of course a lot of these nuclear plants are going to be built along with a lot of other heavy industrial.

We worked for years on putting together what the problems were in the industry to attract the best and the brightest, and it always narrowed down to one thing. It was economics.

If you want to attract good people to an industry that's tough and for the folks in the audience that don't understand the unionized construction industry, we have no paid holidays, no paid vacations, okay? We have guaranteed two hours a day.

If it starts raining, and we can't

work, we get two hours pay. We get no more. It's not like the Collective Bargaining Agreement that you read about on -- in other publications. We are a merit-based, market-based operation in the construction industry.

So, in order to put up with all that, and put the effort in in the heat and the cold that it takes in a tough business that wears your body out by the time you get to your middle fifties, there has to be a compensation level that makes sense for people to want to go through that. And we've found that the compensation level was nowhere near where it needed to be, particularly in the south.

And I want to use one example on apprenticeship recruitment. I won't take a lot of time. Local 134 of the IBEW electrical local in Chicago, Illinois, takes in approximately 500 new apprentices a year. They have 7,000 applicants for 500 positions.

Ninety percent of the successful

applicants have a minimum bachelor's degree. Okay, it's a $100,000 position. 100,000. Take the same IBEW local in Tampa, Florida, where the economics are dramatically different. They take in 100 new apprentices a year. They have 150 applicants for 100 positions, and their academic achievement nowhere comes close to what happens in Chicago.

There's only one reason for it. It's the economy of the profession down there. So, we think that based on all the research we did working with disparate groups, that in our industry, it comes down to the economics of the industry.

Different regions of the country are going to attract the best and the brightest, as opposed to other areas, which are lower-wage states, right-to-work states, competition, illegal immigration, other factors factor into our industry, and you're having it.

So, we could fill those gaps that we have from the demographics, but it really comes down to the economics.

CHAIR PETERSON: I think it was Henry Ford that first discovered that if you pay workers well, you get much better production. And if you don't, you get a lot of turnover, and you don't produce as well.

MR. MCGARVEY: And they can buy your product.

MS. BERRIGAN: The one slide I didn't put, that I actually had in the slide deck that I removed was a slide showing the change in that trend, short of the shifting of that curve that you described.

What we are seeing in the utility side of the industry is that we have been hiring engineers. We've been hiring younger people. The curve -- we're starting to see an uptick from about the 28 to 32 cohort, and the 22 to 28 cohort in there. We're seeing upticks in those areas.

One of the reasons that the industry has invested in the Uniform Curriculum Program was they did recognize the need to bring people in. They recognized the need to be able to train people to come to work faster, and provide them with a more sound academic foundation, so that they would be able to move into those supervisory ranks.

So, I think the investment that we're seeing on the commercial side in technicians through Uniform Curriculum, through the more disciplined and systematic hiring that we're seeing there is solving some of the problem.

If you're familiar with the nuclear utility industry, you know that we do train a lot of folks internally. They come through a training program at the plant. It's a highly regimented, systematic training program with a lot of licensing and regulatory oversight.

So, I think from the utilities standpoint, we're putting the things in place necessary to deal with that curve that you've seen. The other thing that's also a little bit challenging sometimes is explaining that potential retirement number.

The potential retirements indicate people who are first eligible to retirement, not necessarily who we expect to walk out the door the next year. So, between the 9,600 or so people we've hired in last year, we're seeing that continued hiring trend. We're seeing the Uniform Curriculum Program in place, and we're seeing knowledge retention programs and internal training programs.

I think we're managing that issue. It's going to take sustained attention, sustained investment on behalf of the industry, but I think it's something that is a manageable program for us going forward.

DR. CIALONE: Well, in the technology area, I'm with Sean on a lot of the comments that it's an economic question. If you develop the best and brightest, have a certain set of capabilities, and then you say, "Well, there's an uncertain future ahead of you," then they'll find a certain future, and they won't go the direction that you thought they would.

I'm happy to report from our area that manufacturing is cool again. People really care about it. And so, we're getting a lot of bright young kids coming out of college, who are looking forward to doing things in manufacturing technology.

It still takes about five to ten years before they're really -- you're able to let them go without watching over their shoulders, making sure that they haven't made mistakes. And training is part of that, but life experience is a big part of it too.

One of the interesting phenomena we've observed is we, about five years ago, started a new capability called Design

Controls and Automation. We never had that capability in our company before.

So, we've got a bunch of young kids running around, and they don't know what doesn't work because they haven't done it before. And so they're very creative and they're fearless about trying new things.

So, yes, every now and then something goes horribly, horribly wrong, but that's a learning opportunity. So we've recently brought in a gray-hair to make sure we learn without damaging the customer's part. But what you find is if there's an opportunity, if there's time to learn, there's time to have experiences and get good at it, well, we still have a great capacity in the pipeline, and we have to show them that they're going somewhere.

MR. GUTTERIDGE: Well, NRC is very fortunate to be the -- I think the only federal agency that provides support for two-year institutions in nuclear. And the anecdotal evidence from the schools that we hear is that a lot of these individuals going into the welding academies, the trades, the RPs, the I&Cs, the NDEs, they're much more mature people than -- they're not students. They're not 18-to-22-year-olds.

These are people in their late 20s and 30s who are looking for a better job opportunity, and the amazing part is that in many of these schools, the people graduate after two years, and they're coming out making more than a four-year nuclear person would make.

They're making $65,000 to $75,000, and they have room for improvement as well. So, that aspect is not a problem as far as the distance between the folks who are retiring and the people who are being hired.

The four-year and graduate institutions, a little bit different story, I suspect. But keep in mind that half of the undergraduates in nuclear go on and get a graduate degree, their Master's or a PhD. Most of those folks are not headed to the utility industry. They're headed to the National Laboratories, and hopefully the National Laboratories have some retention and knowledge management programs in place because otherwise there will be a huge gap in the knowledge factor.

MR. STOUCH: My observations are -- are basically three. One is new grads. I have observed one of our customers, Westinghouse, and the hiring binge that they have been on over the last couple of years. And gosh, I tell our guys when they're -- we'll go in for a kickoff meeting on a project and there are three of us and 16 of them, "We raise the average age of the room a couple of years with just three of us," and that is because they've hired an awful lot of very young, smart people.

And because it takes five to ten years for people to be kind of self-supporting and functioning in the industry, people who know how to build things, or we think we know how to build things, sometimes provide great insight back to our customer on manufacturability and techniques and the like, but nonetheless, there's the bottom end of the pipeline being filled, the early end of the pipeline being filled.

Another thing, anecdotally, I go to conferences or I meet people and there are a number of people who were in the nuclear industry in the `80s, and they'd love to get back into it. They've gone and they've done something else, or they've been in the metals industry early on. They've gone and done something else, and they'd love to get back into it.

So stealing from other industries is another avenue to help that. I look at our own situation, and we've got some terrific resources who retired, and after about two years either they've checked everything off the to-do list at home, they got bored, or for whatever reason, they wanted to come back.

We've got a number of folks: our former chief engineer, I have a fellow helping me who has been a program manager in our organization for a long time. He was a Navy nuclear officer. People who come back, maybe 30-32 hours a week, and provide terrific resource and knowledge base.

And so we're stretching that retirement curve, and stretching more capacity out of that retirement curve. And so that gives us an early, middle and kind of late career resource stretch and capacity that's very real by the observations I've had, even though some of them are anecdotal.

CHAIR PETERSON: Thank you. That -- it's helpful to understand what some of the differences are in these areas. Second question relates to domestic capacity to manufacture various components.

I think, Jim, you noted that for

small modular reactors, components can be fabricated here in the United States for essentially all elements of that type of plant. And I would expect that that's probably the case also for Gen-4 technologies as well, which also -- well, some of them do require heavy forging. So it would be dependent.

What I'm curious about is the question of the qualification to do that. That is, N-stamps and the ASME certifications and other things. What the status is in that area, and whether or not those are capabilities that have to be added back in or not?

Your company clearly still has its N-stamp, obviously.

MR. STOUCH: Our observation on that are -- is from a couple of angles. There are a number of companies who never were disconnected with the industry, who probably could fill up additional capacity, and that gives us one layer of capacity to utilize.

As Carol mentioned, there are 34 percent new N-stamps that have been issued since 2007. So, there is some capability there, albeit there were over 300 N-stamps when we were doing this for real a couple of decades ago.

The caution there is that it's a culture. Nuclear quality culture takes some time to practice. I daresay that you can buy an N-stamp for $50,000 or $100,000. You put together a little test piece, and as long as you do that well, and you can demonstrate that you have a quality manual that works to the observation of the authorized inspector, you can get an N-stamp.

In our organization, we purposely do not participate in certain markets because our quality culture is a bit more rigid than, say, a dirt-floor fabricator elsewhere in the country, and in some cases, those were hard-won lessons, but nonetheless we know we don't want our people to come in in the morning, and ask them, "Well, dumb down on this project for this customer." And then the next day come in, "Well, today you're working on a nuclear job, and you need to behave differently."

Every router, every traveler in our shop, has a willful misconduct statement on it that everybody reads everyday when they go to perform an operation in our shop. If there's a problem, we need to know about it so we can deal with it. You don't sweep it under the rug, and that's a cultural thing that is partly learned in practice, not just trained, and you wake up the next day with your N-stamp, and move forward.

So, that's a concern, but it's a process. And nonetheless, the market out ahead of itself in some respects, has both built capacity, as well as shown the interest to increase the number of N-stamp holders, and hopefully there will be enough of them in the United States for us to sustain those. I suspect there will be when the demand is -- is certain and real.

CHAIR PETERSON: Allison?

MEMBER MacFARLANE: Just a quick question for Mr. Gutteridge about your program being an academic. I'm interested. Can you say something about the disciplines or sub-disciplines that are covered in the Curriculum Development Program?

MR. GUTTERIDGE: Yes. The Curriculum Development Program, which was the first one at NRC received back in `07, actually before I arrived, is much broader than nuclear engineering, radiochemistry and health physics.

It will deal with anything that is nuclear related, materials, security, safeguards, anything that you can tie remotely to nuclear will be supported.

This does a couple things because obviously the nuclear industry is not just composed of nuclear engineers, and it also opens it up a little bit to schools that don't have nuclear engineering programs, which the number 30 to 35, may be a little more right now, it opens it up to minority institutions.

It opens it up to some of the trade schools that I mentioned. It opens it up to smaller institutions that want to start a nuclear program, or have materials programs right now that could go into a nuclear type of material program.

So, it's a very broad program. I didn't bring the chart that shows it, but I did have one. And I'm glad to supply that if you need to see all the disciplines that they --

MEMBER MacFARLANE: I'm just curious. So, can you just name a few places where they're getting funding for security and safeguard curriculum development?

MR. GUTTERIDGE: Well, probably -- there's not a whole lot of them actually.

MEMBER MacFARLANE: Right.

MR. GUTTERIDGE: Texas A&M might be one of them. We haven't given any to the Monterey School. It's a policy school. So, it doesn't really qualify. Georgia Tech might be another that has a minor program in that. There are only three or four in the United States.

MEMBER MacFARLANE: Yes, right.

MR. GUTTERIDGE: So, that's about the only ones we funded.

MEMBER MacFARLANE: And what about radiochemistry or nuclear chemistry?

MR. GUTTERIDGE: Yes.

MEMBER MacFARLANE: Would we call it a lacuna?

MR. GUTTERIDGE: There's probably five or six schools in the United States that have a true radiochemistry type program. It kind of gets -- nuclear chemistry kind of gets lost in the shuffle with chemistry.

Obviously, I think the biggest and perhaps the best program is Washington State, Missouri, University of Missouri, Columbia. There is a program at Texas A&M, Clemson. Of course Florida State used to have the best program. They halted theirs.

So, there's only about five or six programs. UNLV has a program in radiochemistry. So, they are few and far between. When I went to a radiochemistry conference recently, they re desperate for graduates. They are desperate for students.

I think they said they graduated six PhD's in `09. Six. Not many. Certainly not enough to replace the ones that are leaving.

MEMBER MacFARLANE: That's right.

MR. GUTTERIDGE: But Washington State is doing a great job. Sue Clark is the person out there that we deal with most, and she has 46 students, almost all of them graduate students. There's very few undergraduates in radiochemistry.

MEMBER MacFARLANE: Thanks.

CHAIR PETERSON: Additional questions? Okay, I think I'd like to finish up with just one remaining question, which relates to -- to sustaining these capabilities over time. And so, Jim, you had noted that there's a base of work from the Navy that has done this. And John, you noted also that the national labs have been a customer for nuclear engineering departments over the last 20 years or so.

Maintaining a domestic capacity to manufacture and build nuclear infrastructure I think has been a bit challenging. We're also seeing the stability in terms of going forward is making it very hard to understand how to make investments in this area.

So, one of the things I'm curious about is to what extent we can leverage other areas besides the nuclear energy work to sustain a more stable base? Or, is this something where the fluctuations are going to continue to be just a problem in terms of being able to recruit and retain talented people, again for each of these areas?

MR. MCGARVEY: For the skilled crafts, I -- of course, we're desperate to get this going, really get it going in a meaningful way. But our biggest customer is the Department of Energy. Okay, that's the single biggest entity where members of building trades unions work, across the reservations, across the country.

So, the opportunity to keep them certifications up, and keep those skill sets up that are required to meet the DOE standards at all the different facilities where we're working from MOX out to Hanford is very beneficial to the industry.

It looks like a lot of the facilities that are going to be built, new nuclear builds, are going to be in geographic areas that are relatively close to some of these DOE facilities, which is going to help with the skill sets needed in the area.

Continuing on, we're ready to go. We're ready to train. We're ready to work. We have the capability, but it's not -- like we were talking earlier, we don't build widgets. We train skilled craft professionals.

You don't train and put them on a shelf, and when you're ready, you pull them off and put them to work. It doesn't work that way. It takes years to hone those skills, and get the skill sets and the on-the-job experience to make them that craft professional that they are.

So, the quicker that we can get it moving, the more people that we can get in the pipeline, we can do that. And on top of that, we -- 95 percent of all the existing nuclear plants in the country, we do the maintenance and refuelings on.

So, that again keeps up those skill sets and those certifications, but that's not nearly the number of people that will be needed if and when, let's say when, the real nuclear renaissance goes. We really got to get people in the training pipeline.

CHAIR PETERSON: You also participate then in major capital addition type of activities like steam generator replacements and things of that nature?

MR. MCGARVEY: Yes, of course. We do 95 percent of all the nuclear plants in the country. We do just about all that work.

MS. BERRIGAN: I think as we look forward, the key point that I'd like for you to take away around this issue is the need for a durable national energy policy, and the need for long-term planning.

The challenge that I think you head each of the panelists talk about in the area of workforce and manufacturing capacity is the need for certainty going forward, the need for a climate in which people are interested in coming to work in the industry because they see a future.

Businesses are interested in investing in the industry because they can see the future, and I think that's really sort of the focus of where my remarks are and what I hope will stick with you coming away from this.

When we look at the nuclear education and workforce challenge, we're fortunate that we have 104 operating units. We are developing a staff to replace retirees there.

We developed an infrastructure that's scalable, so that as new plants are built, you can train people to staff those plants, but you still need that long-term plan in order to do it because people aren't widgets. You need to invest the time and effort and resources, and give them a vision of the future that's attractive to them to bring them into the industry.

On the manufacturing capacity side, it's the same story. You need to have a visibility into the future. You need a consistent policy going forward to stimulate the investment necessary in the manufacturing sector.

One of the things that the Nuclear Energy Institute has become engaged in is working with the other parts of the nuclear infrastructure here to talk about opportunities for manufacturers and businesses to support not only commercial nuclear new construction, but existing plant upgrades, existing plant procurement, and also the Department of Energy's work in various parts of the country, and have conducted eight manufacturing outreach workshops to help share information about this, and let folks see the full range of opportunities available to them in manufacturing.

But again, it really drives back to that need for a climate that allows the investment in the long-term planning so that US manufacturing can respond.

DR. CIALONE: From the perspective of manufacturing technology, there's always going to be an ebb and flow among these different industries. Shipbuilding is ebbing. Automotive is flowing again. Mining should begin to flow.

And so, you could imagine that there will be those opportunities to steal from other industries, or repatriate from other industries, but at the end of the day, you got to take care of yourself.

So, I think I'm with Carol. You need to have a plan. There needs to be some vision of the future that people are saying, "I want to be part of that." And they will be there, but if they don't see something that's reliable that they can make a long-term commitment to, that makes a long-term commitment to them, well, good luck. You'll lose people to those other industries.

MR. GUTTERIDGE: I guess for the first time, I'm getting a little nervous about telling students that this is a great thing to enter right now, because we always seem to be behind the curve a little bit.

In the early 2000s, we had a lot of promise in the nuclear industry, and a lot of people started entering it. We had new programs opening up. We had a lot of faculty hires. And now, we have a slow down, and we have these very brilliant students, and they are very brilliant, come in saying, "Wait a second. I'm not sure that the -- no one is retiring. We're not building. We're getting a little discouraged."

You can see we have 4,700 students now in the pipeline. That's frightening because I'm not sure that we're going to be able to employ them all, and you're going to have that downturn again where we had in the early `90s where they were getting educated, and all of a sudden they found there was no jobs.

So, we are really at a crossroads

here, and if we don't see a pick up soon in retirements and in builds, and especially retirements at the national laboratories and the government, because they're really employing the advanced degree students, we might have a problem. And we might need to slow down a little bit.

MR. STOUCH: Well, again, a point I made earlier, one of the things that I think kept PCC and a number of our worthy competitors alive, has been the Navy shipbuilding program and the Navy nuclear program, DOE and the like, specifically the Nimitz carrier program, and it's midlife refits and refueling that are now coming due.

Every several years, a Nimitz-class carrier is going to be coming in for those major overhauls over the next several decades. The Ford-class carrier program, we've decided as a country, that we're going to deliver those on five-year centers rather than four-year centers.

So, that's a bit of an adjustment downward in terms of the demand for the kinds of long lead items that are company and others like us make that we need to sustain our capability. Virginia-class submarine program, on the other hand, it's gone to two boat deliveries a year, and that's been a positive thing in that the supply chain in many cases is relied upon to make up the needed capacity to serve that.

Next will be the Ohio replacement program in the early 2020s, and some of the long leads and design work that's going on now in order to provide this baseload that has sustained us, and gotten us through the valleys before.

I daresay that probably in the mid-2000s, we probably wouldn't be around if it weren't for looking at some of the long lead items associated with the decommissioning of the Enterprise, and some of the carrier work and the submarine work that has been going on.

DOE projects are tremendously challenging and interesting. Not only the nuclear reprocessing and enrichment type work, but the high energy physics work. National Ignition Facility, I think I had the Target Chamber on one of the slides there, star magnet and so forth, other very interesting and challenging projects we've been associated with that joining alloys that seemingly are impossible to weld and join; machining very, very difficult to machine materials, some of which are non-weld repairable.

You screw something up, you now have a 100-ton doorstop. So, these are the kinds of things that exercise or quality programs, our people, our capabilities and allow us to continue to invest in replacing, and/or even new machinery and equipment, and it is the reason I think that for the large part we still have the semblance of the nuclear industry today.

If we'd have to rely only on outage work for the existing fleet, we wouldn't have nearly the capability and capacity that we do today.

CHAIR PETERSON: Thank you. I think that this provides a pretty useful picture of the current situation. One final question, both on manufacturing and NRC, and also I think industry in general: there is interest in the potential to develop new reactor and fuel cycle technologies that could include, for example, even reprocessing facilities, things of that nature, which might have significantly different technical characteristics, manufacturing requirements, construction methods than the current infrastructure.

How capable is industry to respond to changes in the technology? Is this something that we need to be worried about? Or, is it something that US industry is going to be able to adapt to, and move forward towards?

MR. STOUCH: I'd make some comments. It's only money, and it's only time. We have I think the creativity and the capability. Where the rubber meets the road in a facility like ours, laboratories such as Dr. Cialone's, we can get there.

I know that we had a discussion with Idaho Lab on NGNP. How would you build a high-temperature gas-cooled reactor in Idaho, given the size of some of the components? It was sort of a different review of a different material to build the reactor, and how do you do that? How do you solution and yield that? How do you quench it? All of which would have to be done up there.

And we figured out a way to do it. There is a plan that I think we can establish to do this. Obviously, it takes some money and some time. So, that's an important trade off, and optimizing that with selection of materials and size and design specifics is the trick.

CHAIR PETERSON: Any other thoughts or comments?

MR. MCGARVEY: I'll just say from the training and craft people, this training has evolved for hundreds of years, and we've evolved to each new technology, and get the expertise, and can produce the craft professional that can install the components of the new technology. So, it's not an issue with us.

CHAIR PETERSON: That sounds good. I'd like to at this point then, barring any additional questions, thank all of our panelists. We appreciate very much you taking the time to come and visit with us today, and to give us this testimony.

At this point, I think we can call this session adjourned. We will reconvene the Subcommittee at 1:00 p.m. Oh, I'm sorry, 1:30? All right, 1:00 p.m. by my agenda. Yes, 1:00 p.m., we'll reconvene, and in the interim, we will take a break for lunch. Thank you.

(Whereupon, the above-entitled matter went off the record at 11:11 p.m., and resumed at 1:02 p.m.)

A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

1:02 p.m.

MR. FRAZIER: Okay, we're ready to go. Dr. Peterson?

CHAIR PETERSON: Thank you, Tim. This is the third panel for today's meeting of the Reactor and Fuel Cycle Technology Subcommittee. The final panel today is entitled, "Topics Related to Safety, Environment and Local Concerns."

I think that it is important to emphasize that local communities play a key role in terms of nuclear technologies, and managing those technologies. So, we're grateful to have a panel here, which can present to us I think many different dimensions related to the set of topics.

The panelists were specifically asked if they could help us to answer two questions. The first is what role should local communities and governments play, if any, in the development and demonstration of new nuclear technologies?

The second question is with respect to nuclear reactors and fuel cycle facilities, what are the key safety, environmental and security concerns for local communities, and how should these be addressed? And with that introduction, I'd like to turn --

MEMBER SHARP: Mr. Chairman?

CHAIR PETERSON: Yes?

MEMBER SHARP: I wonder if I might --

CHAIR PETERSON: Please go ahead.

MEMBER SHARP: -- make a comment? Because I know it's something the chairman was concerned about is one thing that I think is universal on the Commission is the belief that local communities are critical to whatever we do here.

We were a little concerned that several of our members have to be away, and I'm going to have to step out towards the end of this, that -- that we weren't going to have a full battery of people to listen to your testimony, and we don't want in any way for anybody to assume the staff, the Co-Chairs and various subcommittees are all determined to make sure we are getting maximum input at a recognition: we're not going anywhere on these issues if we cannot meet what local people are concerned about.

Many of you have been participating in this for years. So, we recognize that. But I just wanted to reinforce what actually even lunch hour was discussed among us this concern.

MS. OLSON: Can we have more than ten minutes each?

CHAIR PETERSON: No. All right, let me amplify on Phil Sharp's comment. The scheduling for these meetings has been a challenge for us to organize in terms of all of the different participants and stuff.

And so, the order in which we've

been able to assemble the panels has been driven by factors that have nothing to do with topic. I can sincerely promise that.

The other thing is that we are collecting all the information and archiving it, and it will be made available of course to the full Commission as well. So, with that clarification, I'd like to start by introducing our first panelist, Ms. Diane Curran, partner at Harmon, Curran, Spielberg and Eisenberg, to present. Thank you.

MS. CURRAN: Thank you very much. Oh, that button. Thank you. I really appreciate this opportunity to talk to the Subcommittee.

I have been representing state and local governments and citizen groups and environment groups in nuclear licensing cases for about 30 years. I must say I love my job. And one of the reasons I love it is that I get to work with people who are neighbors of nuclear facilities, who feel a tremendous sense of civic responsibility to participate in the decision making process regarding the safety and environmental risks of those facilities.

There are people who, during the day, might go to work as a schoolteacher, and come home at night and read NRC inspection reports, and write their resident inspector, and call me, and say, "We need to request a hearing on some problems."

And so, my clients take these hearing rights, and rights of public participation and public disclosure very seriously, and so do I. So, I really appreciate this opportunity to address your questions.

The perspective that I'm going to come from is the one of public participation, which is really key. And my overall concern today that I really want to press upon you is I believe we are at a crossroads as a country that although there have been -- there's been this hearing right since 1954, that it has eroded significantly, that it has gone -- it's been very much changed since September 11th for good reasons, but changed in a way that now makes public participation and NRC licensing decisions very difficult.

The question that I think really needs to be addressed by this panel is this is -- this technology really requires a lot of government subsidies if it's going to survive. And is that where you want to put your money, if the people who are affected by these facilities really have no real effective means to participate in the decision-making process?

So, with that, I will go through my presentation. If I could have the first slide, please? Oh, do I get to -- that's what this is for. Okay.

Okay, so, in 1954, Congress passed the Atomic Energy Act. It was basically a bargain that was struck. State and local governments wanted the right to regulate these facilities, and the federal government said, "No. That's going to be done by a federal agency, and in exchange state and local governments will have the right to participate in hearings." And at the time, those hearings were assumed to be formal hearings with a right of depositions, interrogatories, cross-examination.

Over time, that hearing right has eroded. There's a lot of pressure on the NRC from the nuclear industry. In the late `70s, the delays in licensing were linked, I think unfairly, to the hearing process. I think there were a lot more economic problems that were really delaying the nuclear industry, but as a result, the NRC has cut back on some of the major hearing rights that people assume they had back in 1954.

One is you no longer have the right to cross-examine a witness. You no longer have the right to depose the witness. And I can tell you that a deposition is a very, very important tool when you've got highly technical issues.

If you can't sit the expert for the other side down and say, "What did you mean by this sentence?" Then it's very difficult to make an effective case in a hearing.

The NRC also tightened time frames for hearings, set rates of standard for getting more time to prepare for a hearing, and it raised the standard for introducing issues into a hearing, which -- which now it used to be if you had a concern about a nuclear facility and you understood a little bit about it, you could probably get a hearing.

Now, you pretty much need to hire an expert witness, and you need to hire a lawyer. Although there are many citizens who do a good job, the NRC procedures are very labyrinthic, I should say, and hard to navigate.

So, the situation you have is that nuclear facilities generally are not put in neighborhoods where people are very wealthy. They're put in neighborhoods where people have less resources. And so, these people with very little resources have to spend a lot of money if they want to do any kind of effective job in raising their concerns.

So, that hurdle existed as far back as the `70s and `80s. But then -- oh, okay, and I want to mention that the NRC also has hearing procedures for new reactors, which are not working well at all, in my opinion.

The NRC assumed that it was going to have standardized reactor approvals all finished in rule-makings before it got the first application for an individual new reactor license.

The process has gone backwards. We're getting all these applications for new individual plant licenses, when there isn't -- I think there might be one or two designs that are -- have been actually approved, and even those need to be revised.

So, it's kind of like if you had to evaluate a dog that walked in the door tail first. And you have to decide, "Okay, I've only got so much money to do my analysis of this dog, and I don't know how big the dog is, how tall it is, how long it is, how fat it is. But seeing this tail, I've got to decide what to do about it."

It's just it doesn't make any sense, but that is the process that we're going through because there is this rush to license new facilities. And the NRC has not taken control of it in the sense of saying, "Okay, we're going to stop all this until we've got the standardized designs approved."

They're going ahead backwards. So, that's one problem. But the one that I really wanted to talk to you about today is the -- the increased secrecy that we have had to impose on information after the attacks of

September 11th.

I'm not saying that secrecy is a bad thing. I'm saying that even though it may be necessary to protect a lot more information in order to keep people who shouldn't have it from getting it, the other people who can't get it are the neighbors of the facilities, and that's where your dilemma is, I think.

If this is the way it's going to be for the indefinite future; for instance, if I can't get information about what are the severe accident risks posed by a new nuclear plant, or a fuel cycle facility, if I can't get information about whether a spent fuel pool that is filled with irradiated fuel poses a risk of a catastrophic release of cesium that could contaminate thousands of square miles, is that a good thing?

I don't think that's a good thing. And even if you can get a closed hearing, you can't talk about it with anybody. You can't go to your neighbors and talk about it. You can't talk to the newspaper about it. You can talk to the three judges on your panel, and the opposing counsel, and that's it.

Now, most of these technical issues really benefit from debate, from a lot of people knowing about them, and being able to talk about them. For instance, in the 1980s, and as far back as the `70s, the NRC said, "High density pool storage of spent fuel is not dangerous."

There were people back in the late `70s saying, "That's not right." And the NRC just kept saying, "No, you're wrong. We're right." And then finally, I think -- well, I don't know where I am, and I hate these things. But I really just want to talk to you.

Finally, okay, in the year 2000, I represented a county government in a licensing proceeding for spent fuel pool expansion. High-density storage; the pools were packed. And our expert, a PhD, said in the introductory part of the hearing, "This is too dangerous. Even though it's a low probability accident, there's still a risk of a catastrophic fire."

And the NRC said he didn't know what he was talking about; that he really, really was incompetent. And low and behold, he was able to address the ACRS. The ACRS raised the concern, and eventually the NRC staff confirmed that Dr. Thompson was right.

And that led to the staff issuing a technical document that changed its position. That led to the National Academy of Sciences study, and then after September 11th, the NRC imposed a lot of security measures on spent fuel pools.

Now, if you were reasonably suspicious of whether the NRC had done a good job of this, having denied that it was a problem for the past 25 years, and you would like to find out what exactly was done, you are out of luck because that information is classified. And even if you wanted to get a closed hearing on that, you have to show it's very high standard for a need-to-know.

So, I represent neighbors, for instance, of the Diablo Canyon Nuclear Plant. The NRC is proposing to renew that license for 20 years. I really don't know how or whether we're going to be able to get a hearing, and whether the spent fuel pool in the pools there is protected.

So, this is just one example of the kind of issues that are going to come up in new facility licensing cases. All right. Then there is the -- I just want to make a few more points, because I realize I don't have a whole lot of time.

The NRC has a new category of information that is called SUNSI because there's classified information, there's safeguards information, and then there's a new category for which the NRC casts a broader net. That's information that could be helpful to somebody who wanted to cause harm with it.

That includes a lot of information. That includes information. Supposed there's some regulatory gap that the NRC hasn't recognized or filled, or they recognize it and they need to do something about it, but they haven't gotten around to it. Well, that might be SUNSI.

Supposing -- for instance an example of information that was hidden, was the uranium spill. I don't know if you're familiar with that at the NFS facility where uranium was -- a puddle was leaking, and that was kept secret because you wouldn't want terrorists to know that at NFS they can't keep control over their high-enriched uranium.

Well, if you were a number of the public living near the NFS facility, wouldn't you want to know that? Wouldn't you want to know that so you could raise a concern this facility needed better regulation?

So, I think it's an impossible

dilemma myself. I don't see how you can resolve it because honestly, I don't want the terrorists to know that either. But I also think the neighbors should be aware, if that's what's going on.

So, my final questions to the -- oops. My questions to this Subcommittee are if we know that there are safer energy alternatives available, and they need -- and they need subsidies as much as the nuclear industry does, is it wise for us to invest in technology just to produce energy to turn on the lights? Just to produce energy? There's got to be a matter of government secrecy.

It's dangerous technology. If we're going to do something dangerous, shouldn't we all be able to talk about it? Or, should we pick something else that's not so risky?

I'm talking about the risk of catastrophic accidents. I'm talking about Chernobyl-like accidents. This is the BP you can't see: catastrophic radiological accidents are going to be much, much more widespread and difficult to clean up than the BP oil spill.

The other big question is, "Okay, you have a regulatory agency, and it's got two sets of constituents. One set of constituents is the regulated industry that has an interest, which is understandable, and in minimizing the cost of regulation.

The other side is the public, which has an interest in making sure that the regulations are effective, and maybe they cost more money. If the only group that has the information is the group that wants to minimize costs, and they're the only ones that can sit down with the regulators and say, "Here's my concerns, and I hope you'll address them," and meanwhile the public just sits on the sidelines, can the regulatory agency be effective anymore?

So, I will leave you with my questions. Thank you.

CHAIR PETERSON: Thank you. Our next panelist is Kara Coulton. She's Senior Program Director for the Energy Communities Alliance.

MS. COULTON: Thanks. You'd think I would've learned. My name is Kara Coulton. I'm here representing the Energy Communities Alliance. We are the member organization of local governments working on and impacted by nuclear issues.

We are grateful that we can be here as part of the panel, and address the potential role for local governments in deciding America's nuclear future. And we agree with you heartily that there is a critical role for local governments in this discussion. They will be impacted from the beginning to the end of any new nuclear project. So, they really have to be involved.

In response to your first question, what role should local governments and communities play, if any, in the developments and demonstration of new nuclear technologies, we believe again there's a critical role.

Local governments need to ensure the environmental health and safety of their communities, provide outreach and education on nuclear issues impacting the community, act as a liaison between the site and local community, advocate for local concerns and local priorities.

When appropriate, they can advocate for the site, and the project. And finally, local governments ensure economic opportunities exist for the community.

It's the primary role of local governments to protect the health, safety and well being of the community. To that end, the local government cares about the environmental and health impacts of any new project.

Nuclear energy and nuclear waste are issues that raise concerns for most communities, and understanding the details of the project, understanding both the short-term and long-term impacts are absolutely critical. But once known, the local government can help assure that the project is safe, and then if they are convinced of that, they can then be supportive.

In its role to provide outreach and education on nuclear issues impacting the community, local governments usually serve as the honest broker. It can be a trusted source of information, providing education not only to alleviate concerns, but also to outline potential benefits of a proposed project.

Outreach and education can include hosting meetings with site operators, site managers for the community at large, creating public information outlets, websites, and releasing white papers.

As a liaison between the state -- between the site and local community, local governments help to establish and maintain clear lines and open lines of communication.

Again critical, because this ultimately builds trust and accountability amongst parties, which is again critical to the success of any project.

Local governments also are able to provide information back to site operators, and hopefully are seen a truth brokers there as well. An important area where local governments can help is the perception of risk.

In order for any nuclear project or policy to be acceptable and successful, we need to consider not only the technical risks, but also the perception of that risk by impacted parties because it's very important as these are not often aligned with each other.

In the role as advocates for local concerns and priorities, local governments work together with the federal government, with the state, with the private companies, to ensure that local values, concerns and priorities are understood, and that they're taken into account as the project is being planned.

On the other side, when they could be advocates as appropriate for the site and the project, they can help build support and make sure as well that they represent the community's support to other potential partners in a project.

Finally, local government has the role in ensuring economic opportunities. A community volunteering to host a nuclear facility should be provided economic benefits, and local governments are uniquely positioned to help negotiate on behalf of the impacted community.

These benefits may include funding for oversight or training and jobs for the local workforce. In fact, there already are communities looking to develop workforce that's got -- that have the capabilities necessary to support new nuclear technologies, or recycling facilities as they are being discussed and possibly developed.

The Energy Communities Alliance held a meeting in the Savannah River region to talk specifically about their workforce initiative this past April, and that initiative engages state legislatures, universities, community colleges, secondary educators, community reuse organizations, economic development entities, unions and nuclear employers, and they're all working together to look at what's going to be needed down the road, and how to make sure that the training and retraining programs are established to meet those needs later.

They want to attract future new development and jobs to their communities and their regions.

In response to the second question, the key safety, environment and security concerns for local government related to the development and demonstration of new nuclear reactors and facilities, many of the environmental and safety concerns that have impacted communities are likely to remain the same as they are now, specifically security, waste-handling, transportation.

Fortunately, in the energy communities that are adjacent to and impacted by the Department of Energy, or the Nation Nuclear Security Administration sites, there's a greater comfort level with nuclear issues. There's also a good sense of what's needed to fully address these issues and concerns.

As I've already mentioned, and I can't underscore enough: communication. There also needs to be a good relationship with DOE and the contractors, or it's not a federally-owned site with the private sector.

There needs to be assured funding for oversight and outreach activities, including both education and training. For example, in regards to security, communities are going to be able to communicate with DOE.

We've contracted the private sector as they look at security alternatives for the future.

Nuclear security costs are already astronomical. In fact, I was talking to someone yesterday at Hanford. The monitored retrievable storage site, which is huge, underground concrete, with a building on top of it, securing that building annually is $40 to $50 million a year already.

Security also extends to training and emergency response. Local governments and communities need to partner with DOE, and or the private sector, to ensure that there's spending for practice drills. If and when any of these new nuclear facilities are built, they're likely to be cited in less densely populated areas, where the resources don't necessarily exist to make sure that there's emergency planning and response.

An example in regards to transportation, DOE's legally only obliged to share shipping information with the state.

Sometimes the person in that relevant position at DOE is very communicative, and there's a good relationship, and that information gets where it needs to get to. But that's not always the case. Communication, again, is key.

So, as a starting point, ECA proposes looking at provisions in the Nuclear Waste Policy Act, where funding was allocated for affected units of local governments for resources to provide impacted citizens the means to interact with the federal government and any operators, to permit the local community to hire third-party scientists to review data and increase public confidence in the scientific integrity of a project, and to demonstrate a commitment to external oversight of a nuclear project.

Another concern for local governments: As recycling facilities and new technologies are being discussed, developing a final waste plan needs to remain a priority.

We don't want new waste streams created that don't have a disposition path.

Most ECA members support and are interested in exploring hosting spent fuel recycling facilities, but uncertainty regarding where waste will end up directly affects the health, safety and security decisions in communities with sites that currently produce or store waste.

The communities that do do not want to become de facto long-term storage sites. There's also a concern about the environmental impacts of creating increased amounts of greater-than-Class C and low-level waste, neither of which have a final disposition path.

In conclusion, 11 sites around the country volunteered during DOE's now-defunct GNEP program. Congress has directed the DOE to go back to those communities to address nuclear issues.

There are communities out there

that are interested in this, and they want the jobs and the economic benefits that will come with new nuclear development, and they can be advocates. They can contribute to a solution for nuclear waste disposition, but it's absolutely imperative that they are involved now, engaged from the beginning. Thank you.

CHAIR PETERSON: Thank you for those comments and insights. Our next panelist is Dr. Clinton Wolfe. He's Executive Director for Citizens for Nuclear Technology Awareness.

DR. WOLFE: Good afternoon. My name is Clint Wolfe. I'm the Executive Director of Citizens for Nuclear Technology Awareness, or CNTA for short. In Aiken, South Carolina, home to the Department of Energy's Savannah River site, CNTA is a citizen-based charitable corporation dedicated to educating the public about all things nuclear.

I also serve as the Chairman of the Public Policy Task Force for the

Carolina's Nuclear Cluster. With respect to the questions that have been posed, I offer the following observations based on examples from our experience in the recent history of Aiken and the Savannah River site.

Many communities are already heavily invested in federal nuclear initiatives, either through their historical role in the weapons complex, or in the handling of nuclear materials. If these communities want to participate in the future, they should be considered with priority because they already provide the nuclear industry with strong community support, and a workforce familiar with nuclear processes.

Many of these communities have already put in place infrastructure that would have to be replicated at very high costs in a green field setting. An educated and local supported citizenry depends upon frequent and effective communication and its importance cannot be underestimated as misinformation is often used to thwart new nuclear initiatives.

There are however some caveats about community support in former nuclear weapons related communities. We should not expect new missions to be welcomed with open arms if they introduce uncertainty about completing the current missions.

Clean up of existing materials at these sites should not be abandoned, postponed or delayed. Also, we cannot expect these experienced communities to support new technology developments without commitment to manage waste as they are generated.

SRS has a citizen's advisory board, which is very effective in maintaining good communication between the site and potentially affected communities, and on a state level, frequent presentations are made to the Governor's Nuclear Advisory Council about matters at SRS.

My organization, CNTA, often provides letters to the editor and opinion editorials related to matters at SRS and the nuclear industry in general.

The degree to which local communities and their governments play a role in the future will depend to some extent on the models used to develop new nuclear technologies. For example, a pure federal government program would entail a different sort of participation by locals than a public, private or a strictly private initiative.

An illustration of local government participation in Aiken, South Carolina is the Center for Hydrogen Research, or CHR. Located in a research park developed by the community to allow private companies to benefit from a presence near the Savannah River National Laboratory, the CHR construction was financed by a bond levy by Aiken County. The Department of Energy and private companies can conduct research there in any combination of public, private arrangements.

The educational systems in and around these communities can also be significant players. Again, using Aiken as an example, eight regional nuclear employers participated in a workforce development study financed by the Local Community Reuse Organization.

This study pointed out the impending shortfall of nuclear workers in the areas as 50 percent of the workforce would be retirement-eligible in the next five to ten years. Aiken Technical College had already initiated a radiation protection technology program, and recently graduated 24 accredited personnel, with another 150 in the pipeline.

Other nuclear training programs at educational institutions on both sides of the Savannah River are under development. The University of South Carolina Aiken, recently selected by US News as a number one regional college in the south, and among the very best in the country, was also a party to the workforce study, and tailors its offerings with the needs of a nuclear workforce in mind.

The University of South Carolina Columbia recently initiated a new graduate program in nuclear engineering. And South Carolina State University, and HBCU in nearby Orangeburg, has had recent graduates from its new undergraduate nuclear engineer program. This is the only accredited HBCU nuclear engineering program in the country.

From the microcosm that is Aiken, let me also emphasize regional commitment to nuclear industries. The South Carolina Department of Commerce is joining forces with North Carolina to create the Carolinas Nuclear Cluster. This organization is promoting workforce development, small business opportunities, and is supporting education initiatives to provide the workforce of the nuclear future.

An economic impact study for the Carolinas was commissioned by the Cluster, and performed by Clemson University, which illuminated the huge economic impacts of the nuclear industry on the Carolinas.

The Carolinas and Georgia represent much of the focus of the nuclear renaissance, and these three states intend to pursue the development of new nuclear technology. This is a natural consequence of resources such as the Savannah River site, the Savannah River Nation Laboratory, the Institute for Nuclear Power Operation or INPO in Atlanta, the Electric Power Research Institute or EPRI in Charlotte, and the Nuclear Fuel Division of Westinghouse Electric Corporation on Columbia, South Carolina.

The engineering operations and maintenance expertise existing at SRS in 16, soon to be 20, power plants in the three states is truly impressive. The aforementioned educational institutions in South Carolina, as well as those in North Carolina and Georgia bring strong educational resources to the region.

Now, South Carolina obtains more than 50 percent of its electricity from seven nuclear plants operated by SCANA, Duke and Progress Energy Companies. In Georgia, Southern Company is building two now units at Plant Vogtle, just across the Savannah River from SRS.

Vogtle units 1 and 2 have been operating there since the 1980s. In addition, Georgia has two other operating units, and North Carolina has a total of five. So, at the risk of tooting our own horn, I think that the experience in and around Aiken and the region is illustrative of how communities and local governments can and should play roles in the development of new nuclear technologies.

In particular, there is considerable community interest in the creation of an energy park at the Savannah River site, which could be exceptionally well suited to development and demonstration of new reactor designs, flow sheets for recycling used fuel, and fabrication of new fuel systems.

The Mixed Oxide Fuel Fabrication Facility is already under construction there. The talent, the workforce, the know-how and the community support are unmatched. Environmental and security concerns with new initiatives are going to be very similar to what they have been in the past at SRS, and they should be dealt with in a similar manner.

Safety is the hallmark of work in DOE, and in particular, SRS. Our community is familiar with the safety roles played by DOE, NRC and INPO, and is therefore comfortable living amongst so many nuclear facilities. We know that working in the nuclear industry is safer than working in banking, real estate, or staying at home.

The attitude that safety is always number one maintains that trust in our communities. Having said that, there are no apparently unique safety issues with these technologies that we have not encountered before. But if that view turns out to be too optimistic, remember that we are never satisfied that we have arrived when it comes to safety.

We area always checking and double checking when making changes that can affect safety.

Environmentally, SRS is one of the best characterized sites in the world. Beginning 60 years ago, baseline environmental data were obtained, and subsequently monitored to fully understand the environmental impacts of operations on the environment.

This information has been shared openly with the employees, and the surrounding communities, and has contributed to the community's acceptance of SRS. Nuclear industries and environmental protection are not mutually exclusive. In fact, nuclear industries which require buffer zones to meet their safety and security requirements provide opportunities to enhance the environment, as has happened at SRS.

The transformation of the land that was appropriated to build SRS from worn out farmland back in the early 1950s, to an emerald green wildlife sanctuary today is truly amazing. Environmental impacts should be positive ones, not negative ones.

Security at SRS has been effective, and we wouldn't expect that to change for any of these new missions. New security challenges may accompany the business model chosen for the work. That is public, private, or some combination of the two. But if handled as well as it's been done at SRS, there will be no security issues that can't be successfully resolved.

In closing, let me say that the precedent that you are establishing by welcoming citizens' input is greatly appreciated, and it is our sincere belief the illustrations of success for community involvement, such as in the Carolinas and Georgia, can beneficially inform your ultimate recommendations.

Two final thoughts. First, if new nuclear initiatives are cited in communities that are comfortable with nuclear issues, there will be many examples of beneficial participation by the communities, and local and regional governments.

Second, early, open and frequent communication between the nuclear industry and the host communities will ensure acceptance of the industry by the community. Please accept our invitation to visit Aiken and experience the local community and governmental involvement first hand. We are at your service and thank you for the opportunity to express our views.

CHAIR PETERSON: Perfect.

DR. WOLFE: Practice, practice, practice.

CHAIR PETERSON: I think we need to issue a prize. Thank you very much. Okay, our next panelist is Ms. Mary Olson. She was the Director of the Southeast Office of the Nuclear Information Resources Service. Thank you for coming, Mary.

MS. OLSON: Thank you for this opportunity. My name is Mary Olson. I do work for Nuclear Information and Resource Service, often called in the world NIRS.

I want to personally thank the three commissioners to whom I'm speaking, and express the hope that some of the others might watch the webcast later. I was so looking forward to giving a radiation lesson to the senator, and had hoped we might have a conversation. So, I'll hold it for the future.

I bring also two items I want to put in the record, with the specific statement on film that these are copyleft, which means that if you post it on your website, there's no problem. My organization was involved in producing both of these. They're short; less than a half hour. One, Climate of Hope, takes on the whole issue of whether nuclear power is in fact carbon free, and whether it can in fact set enough carbon off to meaningfully contribute to the climate crisis. It's not the content of my comments today, but I submit it to the record.

And Wastelands, which is an incredible film produced during the life of Grace Thorpe, daughter of Jim Thorpe, who, along with several of us in the NGO world helped turn back the targeting of Native American lands for high-level nuclear waste. And I sincerely hope that we will not repeat that shameful piece of our history in the recent past.

Twenty-seven tribes were specifically targeted for an MRS during those years, and this film documents those voices.

CHAIR PETERSON: We will certainly

get those into the public record on the website. Thank you.

MS. OLSON: Thank you. So, radiation is why I'm here today. The two questions you gave us, really if it weren't for ionizing radiation, we wouldn't bother. I'm not saying we'd all sign up and say, "We love nuclear energy," but I don't think that we would have the level of concern that we have.

I was inspired this morning to add that I've been in my job for 20 years, and the reason I have this job is in part because six years before that, I was in a research lab that had a lot more ionizing radiation than most research labs have, and unfortunately, I got it and took it home.

So, that has changed my life, and I work with many people who have a similar level of experience directly. So, we were founded in 1978. Where am I? Okay, is that how that works? Yes, okay.

Founded in 1978 by grassroots activists in communities. Not everybody is an activist, but most of us are. And they were opposing the construction of new reactors at that time in the 1978 in their communities. Today, we have members in all 50 states, and I would say that one of the failings of our community is that we never trumpeted the fact that we had a three-quarters victory. Over 400 reactors were online, under construction or on order when we were founded. Only 120 were built, and a number have been closed by the activists in communities that have shared these concerns.

So, we have a disproportionate representation in our membership of people in reactor communities existing, and proposed nuclear waste sites. And I'll just mention that in addition to the 27 tribal sites, there's a number of other high-level waste sites that we've been involved in during the 20 years I've been on staff, and over 20 so-called low-level waste targeted communities have come to us during the same period.

So, we've been very involved with all of these issues, and I hope that my colleague, Diane D'Arrigo, will have the chance to address some of the issues as well. And I just want to mention that we did in 1998 petition then secretary of energy Richardson to disqualify Yucca Mountain, and again, we could share more about that another day.

But if it weren't for radiation, we wouldn't be here. And so, given that fact, I want to focus on it. There is no safe dose. And all it takes is single cell and a single radioactive emission to start a fatal cancer.

Obviously, it doesn't happen every time, but every single event carries that risk. And it's not just -- you know, a little tongue in cheek here, it's not just a folk song. This is enshrined in the Environment Protection Agency standards. It is reflected in NRC's Part 20 and ALARA.

The National Academy of Science's series of reports, seven reports now, on the biological effects of ionizing radiation have upheld this view. And most important, I will be sending an annotated bibliography of studies with data that support this view.

A lot of people don't know that you can actually see the damage of radiation. Most of it is so small that artists have to render pictures of tracks and cells, and -- but you can see broken chromosomes. I didn't bring that picture. You can see other structures damaged, cell membranes damaged.

This is a picture of what happens to plutonium in a lung. I know none of the Commissioners are trained in biology or medicine, and I just want to share that I was trained as a biologist, and I track radiation issues very closely.

The Department of Energy has had a low dose program that I think is well worth looking at what they've been doing. And basically, you have to say that it all boils down to what's acceptable. What as a society do we accept?

When I was a child, there was debate about 1 in 1 million deaths coming from an industrial activity. Superfund turned into 1 in 100,000, but then with some very challenging clean ups, some of them are as high as 1 in 10,000 people exposed getting fatal consequences.

So, what do we accept from recollection? And I just want to look not at the radical points of view, but at the US Nuclear Regulatory Commission's own dose response, which was a rare moment of disclosure that happened in 1990 when they published the below regulatory concerns statement, the other BRC.

Every time I hear BRC, I'm having flashbacks, because this was the issue that brought me into this work was the deregulation of radioactive waste. In that policy statement, they published their own assessment. And this slide is elaborated, but basically NRC said that you get 3.5 fatal cancers per 1,000 exposed.

But the truth is that's 1,000 adult males exposed. What I've added on here is the findings about the exposure at that level to embryos, first male, and then female, because we also have findings saying that women are 50 percent more vulnerable to ionizing radiation health effects than men.

Now, actually, I'm going to go back for a second because I want to disclose that I am including all radiation health effects when I'm looking at the embryo. If we only looked at cancer, which would be the more fair comparison with the NRC's own 3.5 fatal cancers per 1,000 people exposed, then we would only see a four times increase, but it is a four times increase.

So, forgive me. It was late night. I made the wrong choice maybe, but I'm disclosing that.

So, somewhere between four and 20 times more impact to the unborn child, and what is this from? This is from 100 millirems a year over a lifetime. So, this is perfect performance. This is not an accident. This is not high risk. This is we accept this at this time.

So, again women have more vulnerable tissue that accounts for why we have a higher cancer rate. It's not some weird gender thing. It's visible in our bodies.

So, do the simple math. NRC assumes linearity. So, if you double your dose, you double your response. I just did the simple division years ago, and found that 3.5 fatal cancers in 1,000, and I'm adding men, results in 1 in 286. And I think it was a bombshell. I don't think the NRC folks had ever done that simple division.

They got kind of nervous. Then

you add the 1.5, and you're up to 1 in 191 women. Again, this is non-accident, normal operations. Actually very good because the licenses all allow more than 100 millirems. Of course ALARA brings it down, but fuel cycle facilities, they don't do so well with ALARA. We don't know about waste facilities. They're all leaking, we know that, at low-level cites.

So, you get down to the numbers for impacts. Again, all types of impacts in utero, and it's pretty high really. I mean you get to 1 in almost 10 potential outcomes. Now, again, does this happen everyday? I'm not asserting that. I'm just saying this is NRC's own assessment of risk of the numbers that they consider allowable. I'm not changing them.

So, when you apply it to the whole US population at the rate of 1,000 here, 1,000 there, 1,000 all over, the numbers aren't small. There's a non-fatal cancer for every fatal cancer. That's well understood. And as

I say, we're talking about things like spontaneous abortion in terms of the impacts to embryos.

But the next slide is very interesting. A lot of people in the industry think that background radiation is nothing, and that there's no impact on us from it, and that all of this stuff about dose response is like extra insurance so that if people screw up, there's room to move.

But in fact, there's background cancer from background radiation, and when I started this work, 100 millirems a year was touted as background radiation. I'm not going to go up to 360. It looks even worse if you do that.

So, basically, if we allow up to 100 millirems a year from annual operations of a nuclear facility, we're doubling the dose of ionizing radiation to ourselves, to our public, to our family, over 100 millirem background.

So, with a linear model, that doubles the response. And I just like to remind people that if you doubled all kinds of parameters like carbon, or temperature, or anything else, I mean as a biologist, it's no surprise to me that you would see some effects from this. And if you go out and talk to people about cancer, we can't prove what causes which cancer, but you also can't prove that something didn't cause that cancer.

If you have somebody who loses a child, you can't prove y. But you can't prove it wasn't y. So, I'm going to note that I have more to give in this proposal, in this presentation, but I just want to share very quickly the two graphs that you probably have never seen in your life because dose response you can understand. It's linear. You double the dose. You double the effects.

But this is the life cycle. This is what I've showed you on the bar chart. This is the embryo responding, stabilizing the adult, and it's Sally Stewart's work that shows us that you have an uptick at the end of life.

The healthcare debate: I'm not even going to go there about care of elders. But the point that I'm bringing to you from the communities, as a mother, from all the mothers I speak for, we cannot disregard the impact to the children. Standard reference men cannot reproduce by themselves. We have to look at this.

There's the chart with the females added. It doesn't go high enough actually. You got to double that one-and-a-half times for the girls.

And finally, skipping several things here -- oh, I do want to say. Part of why I'm here: plutonium is twice as bad a uranium. What elected official should ever sign off on that? I mean there's no elected official alive and in office to day who is responsible for the uranium fuel cycle, but to sign off on a doubling of all this with plutonium, which is what you get? I don't think there's any elected official, if they were fully disclosed, could or would do that.

Now, AP1000, you'll have to read it later. But this is a slide I want to end with, and the next one, because there's been a lot of ideology expressed over the last day. And I do want to come forward with the fact that I really am pro-nuclear.

It's just I like my reactor 93,000 miles away. And we've heard a lot of testimony about nuclear's role in the climate crisis, and I ask this committee: I don't think it's necessarily your job to do a full NEPA analysis on the decision to spend billions, possibly even into trillions of dollars, on building a new build on nuclear, as the -- you know, the justification for this money being spent in the public sector is the climate crisis.

I agree we must address the

climate crisis, but where is the NEPA analysis showing that this is the cost effective way to do it? And this year marks the historic crossover, in which a healthy energy source -- but the Rolls Royce, PV, I mean retail PV. I mean call the guy and have him put it on your roof PV is now cheaper and going down, while nuclear per unit of electricity that would be generated has passed that going up.

So, we call it the historic crossover, and on behalf of all of those children who -- you know, who knows? But there's future generations, and on their behalf I'm here to say we have better alternatives. We can do better. The experiment is over. There's no reason to restart it. Thank you.

CHAIR PETERSON: Thank you. And now, our last panelist is Mr. Paul Bembia. Thank you. Program Director for the West Valley Site Management Program Office of the New York State Energy Research and Development

Authority. Thank you.

MR. BEMBIA: Thank you, Dr. Peterson. Can you hear me okay? Okay, great. As you said, I'm the Director of the West Valley Site Management Program for the New York State Energy Research and Development Authority, and also known as NYSERDA.

NYSERDA holds title to the Western New York Nuclear Service Center, more commonly known as West Valley, and it was the home of the only commercial nuclear fuel reprocessing facility ever to operate in the United States.

The events at West Valley provide the basis for my comments, and the concerns of the community, and the role of local government, and the development of fuel cycle facilities. So, I just wanted to step back a little bit through some of the history.

In the early 1950s, the Atomic Energy Commission encouraged the private reprocessing of spent nuclear fuel as part of the program to commercialize the fuel cycle.

New York State became interested in the privatization program as a way to promote industrial development within the state. And the AEC program also created interest within the business community, and the Davison Chemical Company set up nuclear fuel services to pursue the West Valley reprocessing venture.

Davison Chemical would eventually be purchased by WR Grace and Company. Instruction on the plant began in 1963, and was completed in 1966. NFS was licensed as the operator, and the New York State and Atomic Research and Development Authority, which is a predecessor agency at my agency, was licensed as the owner.

Construction costs were about $33 million. About 640 metric tons of fuel were reprocessed at West Valley between 1966 and 1972; 380 metric tons were from the end reactor at Hanford. This was supplied by AEC under a baseload contract with NFS.

During the time it operated, the facility experienced operational difficulties, higher than expected worker doses, and unplanned releases of radioactive material to the environment.

After operating for six years, NFS halted the reprocessing operations in 1972 to make modifications to increase capacity, reduce worker doses, and reduce radioactive effluents. NFS expected that those modifications would cost about $15 million.

During the shutdown period, there were new regulatory requirements issued by the Atomic Energy Commission related to waste management and disposal, and earthquake and tornado protection. NFS estimated that meeting those new requirements could cost as much as $600 million, and they concluded that it would not be economically viable to continue reprocessing at West Valley.

NFS informed New York that it was withdrawing from reprocessing, and that it intended to turn the facility back over to New York State. At that time, the facility contained 750 spent fuel assemblies that had not been reprocessed, 600,000 gallons of high-level liquid waste stored in steel tanks, a highly contaminated main plant process building and two radioactive waste disposal areas that contained almost 3 million feet of radioactive waste.

The United States Congress held hearings, directed the GAO to investigate the issues, and directed DOE to study options for the future of the center, and those activities resulted in Congress passing the West Valley Demonstration Act in 1980.

The Act directs DOE to solidify the high-level waste, transport the solidified waste to a federal repository, dispose of the low-level waste, and decontaminate and decommission the tanks, facilities, material and hardware used in the project.

In 1982, DOE assumed control of

about 180 acres of the center, and NYSERDA continues to manage the balance of the property, including the commercial disposal area there. As directed by the Act, the federal government pays 90 percent of the costs for the project, and New York State pays 10 percent.

The Demonstration Project has been underway since 1982, and the liquid high-level waste has now been solidified into a glass waste form that is suitable for disposal in the repository. And there are 275 canisters of vitrified high-level waste that are stored at West Valley and awaiting disposal.

NYSERDA and DOE are using a phased approach for decommissioning there, and the first phase of decommissioning will start next year, and will take about ten years, and the end-state for the second phase of the decommissioning has not yet been decided.

The combined federal and state expenditures for the project from 1982 to date amount to approximately $2.6 billion. The phase one decommissioning work will cost another billion dollars over the next ten years, and the phase two decommissioning costs could range from $500 million if the facilities are close in place to as much as $8 billion if all the remaining wastes and facilities are removed.

So now, I'll shift over to the concerns of the local community, and they really fall into three main categories: environmental impacts in public safety, economic impacts and long-term responsibility for the facility.

In terms of the environmental concerns in public safety, concerns there developed during the six years that the reprocessing facility operated. There were operational difficulties that included filter blowouts that released cesium 137 to offsite properties.

There were releases of high

activity liquids to soil beneath the process building that formed a strontium-90 groundwater plume, operational discharges that contaminated creek sediments, disposal trenches that filled with water and released radioactive material to streams, and incidence of worker contamination and overexposure.

The releases of contamination and the exposure of workers: those were significant concerns at the time the facility operated, and these incidents undermined public confidence in the safety of the facility. The community safety and environmental concerns also extended to the present.

As I mentioned, the first days of decommissioning, which starts next year, will remove some very significant sources of radioactivity, but the second phase hasn't yet been decided, and facilities there that'll be decided at a later date include the high-level waste tanks in the disposal areas.

There's strong support in the local community in the region for the complete and immediate removal of all the remaining facilities and contamination, and for releasing the property from restricted use.

The cancellation of the Yucca Mountain project has also introduced another present day concern, and that's that the 275 canisters of high-level waste presently stored at West Valley may be there for decades to come. A local elected official recently told me that it feels like we're starting all over again.

Regarding economic concerns, the local community leaders and residents feel that they've paid a high economic price for the presence of the facility there. NFS never employed more than 265 full-time workers. So, the economic benefits when the facility operated were really minimal.

Residents and local officials believe that property values in the immediate area have been impacted due to the negative perception of the presence of a failed nuclear plant, and radioactive waste disposal areas in their community.

The site also is owned by New York, so the property and all of its improvements are tax exempt. And according to town officials, the site and its facilities represent about 90 percent of the assessed valuation of the property in the town.

We do, New York does, provide a $500,000 annual payment in lieu of taxes, and that's split between the town, the county and the school district. So, that does help to balance the tax losses. And also on the positive side, NYSERDA is presently engaged in a process where we're looking to release about 185 acres of unimpacted property and a warehouse that's no longer used.

We're attempting to get that released from the NRC license. If we are able to release it, we could then make that property available for sale. And if it is sold, it could be returned to the tax rolls.

The final concern are responsibility concerns, and I think it was pretty clear that when NFS announced that they were leaving and turning the facility over to the state, the responsibility concerns at that point, it became a critical concern.

If there were to be a proposal to establish a new facility there today, I think the community and government representatives at all levels would want some questions answered, which would be will the facility be designed, constructed and operated to allow its eventual removal? Or, will it remain in the community forever?

What provisions will be made to replace tax revenue if the facility is tax exempt? Who will be responsible for the mitigation of any hazardous or radioactive materials that are released? What happens if the facility shuts down or goes bankrupt? Who will fund the decommissioning, dismantlement, and disposal?

How much money will be set aside for decommissioning, and how will the funds be held? If the funds are not adequate, will the clean up be guaranteed by the state government, federal government or both?

So, based on the West Valley experience, I think it would be important to have these types of issues clearly addressed in a written agreement.

In regard to the role of state and local government in the establishment of a new facility, there would probably be a direct regulatory role for the state in at least some aspects of the citing, design and operation of the facility, and we expect the state to participate fully in that role.

Regardless of the specifics of their direct regulatory role, there should be an effort to maximize the state's involvement through some kind of formal agreement in order to engender the state's trust and acceptance of the facility.

Local government is likely to have some role, perhaps in citing and environmental review process for a new facility. And that review could include the consideration of local impacts like impacts from effluence, noise, traffic and land use changes.

Other important local considerations would be the potential for economic growth, jobs for local residents, changes to the tax base, property values, emergency planning and emergency response.

And I just have one more comment. Because the formal role of local government may be limited, mechanisms should be established to allow the community and local government to provide meaningful and comprehensive input during all phases of the project.

I previously suggested maximizing state involvement to engender trust and acceptance, and that applies to the local community and local government as well. The issues of importance of concern to the community should be identified, discussed and addressed in a formal agreement early in the process. Thank you.

CHAIR PETERSON: Thank you. That's excellent, very helpful, and furthermore I appreciate also that we have the written copy of this testimony. The -- you've raised a whole list of --

MR. BEMBIA: Yes, the long version.

CHAIR PETERSON: These are all things, if one doesn't learn from experience, then you have -- you have some significant potential for just repeating ongoing problems.

MR. BEMBIA: Right.

CHAIR PETERSON: Definitely. At this point, we'll move to the question and answer session. And to mix things up a bit, I won't start with questions. I'm going to ask -- I have plenty of questions, I promise. But I'm going to ask Phil if he'll start.

MEMBER SHARP: Well, first of all, I just want to reiterate something I said yesterday about what my belief of the charge of our Commission is, and because again today's panel is not yours necessarily, but might suggest to the audience that we are in the process of trying to judge what the incentives are to be for new power plants, or not be for new power plants, or which power plants ought to be built.

Clearly, we are looking at this question of whether or not the government ought to be engaged in the other fuel cycles. The reason for our look at that, in my view, is because of the impact on waste, and while all of these issues ultimately fall together, our charge is to figure out what to do with the waste which we've already got piling up all around the country and your communities obviously, kind of thing.

So, that's sort of my view of -- about new facilities is new facilities means would that be an away-from-reactor storage? Multiple retrieval storage, we have multiple means for that thing. And the other is the ultimate waste disposal site.

But others on the Commission may have a different attitude about what our charge is, and it's larger than that. But my own view is it's a very difficult and serious charge, but it's not quite as big as might be implied.

One question let me ask Kara Coulton. I'm trying to understand the nature of your network and your organization a little bit. So that if, for example, the government were or were not going to pick a site, but were to go into the siting business for either the ultimate disposal or the other, does your organization become engaged automatically where there is a new site?

I mean do you seek out to give

assistance to -- because a local community, it's a huge learning process I'm sure for many people as to how to engage obviously. You could spend a lifetime. Not a full lifetime, but it may seem like it, trying to figure out how to engage.

But I guess I'm trying to think is -- I don't understand the nature of your capacity and your sort of organization --

MS. COULTON: There's no institutional framework for us to be automatically engaged if a site were to be suggested, but we would absolutely like to be engaged if the site were to be -- were to be suggested.

MEMBER SHARP: Because I can imagine from the point of view of -- in the sense -- it shouldn't just come down to proponents of opponents, but there needs to be an educational process as to how we can have a serious conversation about the serious issues, and I think it's -- organizations like yours can. I noticed in your list you do.

I assume in some communities, they tend to be more positive advocates for the local facility, and others are more challenging it, and even trying to maybe get rid of it. And -- but the point is teaching both sides or all sides how to have a serious conversation. That's really tough. We even have trouble in our Commission figuring out how to have that conversation.

And so, I just think there's a very useful role, which many of you have been involved in on different levels on this. I don't have a lot of other questions. The reiteration of the West Valley experience is a very important one, obviously, which again tells you we're learning a lot of lessons on what not to do. I'm not sure how many lessons we're learning of what to do. But yes, Ms. Olson?

MS. OLSON: I want to respond to your question because we tend to be reactive in so far as we're small, and yet there's not a single waste proposal that hasn't ended up on my desk or my colleague's desk in the last 20 years. And it is people who do need to learn fast because things are coming at them fast.

And I can tell you that we made a commitment and are following through on it in terms of this Blue Ribbon Commission to facilitate awareness of your existence, to facilitate awareness of your meetings, to hopefully be a conduit for people to make comments, whatever comment they want to make.

We're not passing out -- you know, I can't guarantee there won't be a pre-canned email. I can't guarantee that. But my commitment is people's voices need to be heard, whatever the voice is. And you know, I think my colleagues in the southeast can attest to the fact that we're there to engage respectfully in processes when we show up.

So, I agree that the whole goal of

a democracy is for decisions to be as good as they can be, and I think one of the things that we just have to face right now is that you all have the biggest hot potato in the world, and I don't know how we're going to come through this without it turning into an us and them. I would love it for it not to do that.

MEMBER SHARP: I don't expect it not to become an us --

MS. OLSON: I love you for that.

MEMBER SHARP: But I also would like to have us try to provide fora where people can really seriously challenge technical data as well. I mean I'm --

MS. OLSON: I agree with you.

MEMBER SHARP: Help create the National Waste Technology Review Board, not -- I haven't really followed up on its history is the thing, but the intent was to particularly allow both outsiders and insiders in the program to be able to raise technical issues that at least could get some scientific examination. Whether it's always happened that way or not, I can't guarantee.

MS. OLSON: And I just want to add one little quick additional comment, because one of the shocks of my life this year was going to the Nuclear Regulatory Commission just in June, to actually advocate for something. And one of the Commissioners said, "Gee, this is the first time I've ever heard you guys advocate for anything."

Well, it's coming from the closed reactor communities, which I think has got to be close to the top of your list. The call, it's on your website for safeguarding the waste that's there.

MEMBER SHARP: Right.

MS. OLSON: For hardening it, and saying there's no intrinsic value in moving it just to move it, which is basically what centralized interim storage would be. I mean we can't say that the sites that it's at now are bad. The NRC came right when the Nuclear Waste Policy Act was going to be amended in -- no -- yes, 1994, and said, "You can't say the sites where it is now are bad." That's not the basis for saying it has to move, right?

I mean they're licensed, right? You going to go against that? I don't think so. So, the issue then is how do we live together with this thing we've made. And it's been very impressive to me, and I hope that the is Commission will hear from the people who advocated for what we call HOSS, or hardened on-site storage, because it's a genuinely amazing stance to take that they don't want to dump on someone else until there is a situation that will actually improve the circumstances for that material. And then the transportation risks may be justified. But in the interim, no.

And so, I think it's very, very interesting what can happen in an open discussion, and it took a long time for people to be willing to listen to and rally around, and I just want to bring to your attention that there's over 200 organizations that have backed that idea varying points of view on energy. But in terms of waste, I just really didn't have time to emphasize that. So, forgive me.

MEMBER SHARP: No, no.

MS. OLSON: But that's important.

MEMBER SHARP: I appreciate the comment, and while we're -- we cannot claim it's going to guarantee everything is read, or everything is perfect, this is the most transparent government entity I've ever been involved with so far. We're not a governmental entity, but obviously we're a federal advisory committee, which is the next closest thing kind of thing.

And precisely, we get a regular from the staff summary of all the comments that come into the thing. And while we can also peruse that all, and I can't guarantee you I read each comment, but I certainly read the summaries of all the comments. And so, the main issues I'd be surprised of all of us at least aren't aware of what people are claiming. That doesn't guarantee it appropriate consideration, but hopefully that it will.

MS. COULTON: I just wanted to add something in response to your question, which was during G-NEP, we did as an organization receive funding and support from the Department of Energy to do outreach with communities on issues related to recycling, reprocessing and citing a facility.

MEMBER SHARP: One of you, maybe it was you, I can't remember, in the Nuclear Policy Act referred to the impacts thing, which as I understand -- I don't know how well that's worked because I don't know the history. But in Nevada at least there was funding for the --

MS. COULTON: Yes, the Nuclear

Waste Policy Act provided funding.

MEMBER SHARP: So that technical people could not be totally at a technical disadvantage as to dealing with the agency. And it seems to me that ought to be a main principle always of trying to make sure there's a potential for technical challenge, not to mention value and political challenge. Thank you.

CHAIR PETERSON: Allison?

MEMBER MacFARLANE: Thank you very much for your presentations. One thing that I heard from a number of you was communication. Actually, I think it applies to all of you. And so, I would be curious to know, as Phil pointed out, and I agree with this characterization of our job, as we think about processes for dealing with the high-level nuclear waste incident, nuclear fuel, and including a repository kind of situation, what do you envision?

So, I'm asking you to go beyond

your remarks today, okay? And speak from the expertise that you all have. But what do you imagine is the best way for whatever entity it is that manages this to handle the communication? And what needs to be communicated, and how should that be done?

And then B, how can we as a Commission improve our communication. Just start at one end, and then move to the other. How about that?

MS. CURRAN: Well, I think generally most of my work with respect to waste storage, spent fuel storage, has involved concerns about the risks, the safety risks and environmental risks.

And I think there's a dilemma about communication. If information is sensitive security information, the only way you can communicate it is in a closed setting. So, then a question is is that good enough where you can't really talk about something publically and get input on the debate.

And so, I think there's basically a fundamental problem there, and even if you have -- even if you can get a closed hearing, it's never going to be what you want when something is that dangerous and that complicated. You don't want to have just a couple of people who are deciding the fate of a huge area, and a lot of people. You want to have something that you can really debate.

I'm not sure -- the issues about say a repository, I haven't noticed that there's been so much SUNSI or safeguards information with that. So, that's really important to look at the amount of effort that went into creating a record for the Yucca Mountain licensing proceeding.

That's really a great thing that that was done, and it's great that the DOE is going to preserve that information. But really, when it comes to accident risks in this -- in this era, in the post-9/11 era, I think there's some real barriers to communication. There's some real conundrums that I'm not sure how we're going to solve them.

MS. COULTON: I think there has to be a true commitment to communication and not just a ticking the box. I think sometimes that's the problem is you put it on the list, and say, "We're going to do it," but there's no infrastructure for ensuring that that's actually going to happen.

I think there needs to be a known point of contact for communities; somebody that is dedicated to providing outreach or answering questions, and if someone with a phone number that works, they answer it.

I mean I know it's too late to put a local community on the Commission, but that would've been great. And I know you all have been to Hanford and to Idaho, and I think -- I know that the communities that have facilities would love to see -- I know there are limitations, but would love to see you in their communities as well.

MEMBER MacFARLANE: Yes, okay.

DR. WOLFE: Yes, I guess I'll approach the communication issue from maybe a slightly different perspective, and that -- there's a good news/bad news story. Let me do by example again, like I did in my presentation.

On the good news side, I think we have some examples at Savannah River that are very effective. My organization, for example, sponsors what we call Up & Atom Breakfasts, and we have guest speakers.

Well, at least once a year the site manager from DOE gives that talk. And people can ask questions until heck freezes over, and they've always been very forthcoming. It's a good opportunity.

They also have other numerous opportunities to address the public, and several areas where we can -- we can -- several opportunities where we can talk to them.

Now, the bad news part is the community, when you develop a really good relationship, feels like they're partners. And they feel like you're invested in what you two have decided together. And if that partnership is breached, then some folks get upset.

And frankly, that's kind of like Aiken. Nobody in Aiken that I know of says, "Oh my god, we never should reprocess fuel." There's a lot of folks that think we really ought to do that. We shouldn't put fuel in Yucca Mountain, but there's also a lot of folks in Aiken that are saying, "Well, we had a deal, and we've got defense high-level waste, and there is no alternative for that."

And so, there's some mad folks in Aiken, okay? But in general I would describe the relationship between that community and the DOE and the contractors that run the site and have run the site as an extremely good partnership, but it gets a little fragile when we feel that the deals aren't kept.

MS. OLSON: Wow. This is the first time I think I'm going to repeat what he said.

MEMBER MacFARLANE: I'm glad I brought you together.

MS. OLSON: Well, we're together more often than you imagine. But I hardly ever come behind him and say, "Yes."

DR. WOLFE: Let me write this down too.

MS. OLSON: But I'm going to use the Yucca Mountain example in a different way. This is a structural comment more than a communication comment, but again, if what you're communicating is not even mush -- I mean it's completely not credible, how do you get there? How you get there is because there was a plan or a rule or a guideline set in statute.

And some people said, "Hey, you're

not meeting your guideline." And the answer comes back, "Well, you're right, but that's why we have to keep studying it." And then how much money is spent, and how many years go by? And we're finally saying, for whatever reasons, "Yes."

I mean I basically feel that our 1998 petition to disqualify Yucca Mountain is finally being delivered, but the intervening years was one goal post being moved after another, to the point where you cannot say there was a scientifically credible process in the United States on high-level nuclear waste.

And I'll take the part of South Carolina on plutonium. He didn't use this example. I'm not repeating him on this. I'm not putting words in his mouth. But the point here is that plutonium was moved to South Carolina under the auspices that it was going to, "Have an exit strategy." And now, South Carolina is the nation's plutonium storage site.

I personally live on the highway that would take the irradiated fuel down to an energy park in South Carolina, which is why we show up at the same places. And as far as I'm concerned, I don't want South Carolina to be the new irradiated fuel destination disposition anymore than anybody in South Carolina is saying they're volunteering for that.

But when you see the goal post moved, and the story change, where is the credibility? How can you believe it?

So, I'm going to make a very quick structural suggesting just because it's in my craw. I think this country copied the Iroquois Nation, but we left out a really important piece. It was called the Council of the Grandmothers. I'm not suggesting you get a bunch of grandmothers, but I am suggesting you get some of its size, an engineer, and besides a physicist to have some oversight authority on all this stuff because my presentation matters. You need to get the health community involved.

You need to get ordinary people involved to have an oversight function, who can say, "Wait a second. Why are you moving that goalpost? Does that make sense?" And have some real authority that can be turned to, so that there's a restructuring and a rebuilding of credibility in this picture. Because right now, you know, good luck.

MR. BEMBIA: I've been at West Valley. I started there about 20 years ago as a staff geologist. And when I began there, we had pretty routine one-way communication, where site representatives would stand up at a meeting, and there'd be PowerPoint presentations, and we'd make our points, and the public would make their points, and everybody would go home, and nobody would move.

And then after -- about 14 years ago, after the first draft environmental impact statement for decommissioning came out, DOE and NYSERDA established what we call a citizen task force.

I think we have 18 or 19 members now. There are local elected officials, members of the fire department, the VFW, the county health department, the school board. There's a local doctor, business representatives, residents, some environmental groups. There's a representative for the League of Women Voters, a college professor.

That groups has been meeting almost monthly for 13 years. And some members have come and gone, but generally we have a core of people, and folks usually stay around for quite a number of years, and they become very well educated on the issues.

And NYSERDA and DOE, the directors of NYSERDA and DOE and myself and Brian Bower at West Valley site, we're at the table with this group when they meet. And we'll still get some presentations on issues, but then we really sit down and discuss them.

If the CTF has concerns, we really try to address them, and we really try to work with them to make sure we understand what the concerns are, and see if there's a way that we can actually address those concerns.

It has become pretty effective, and one of the examples is I mentioned in my remarks about that property release that we're currently engaged in. That was a request from the Citizen Task Force, and local representatives. And so, we're following up, and they really, even though we don't have somebody waiting in the wings to redevelop that property, the recommendation from that group was, "Well, if some opportunity comes up and it's going to take you two or three years to get it off the license, we'll miss that opportunity."

So, we are moving forward with that. So, again, that group meets. We can provide more information if you want to know about it, but it's actually worked very well.

MEMBER SHARP: With the folks that are representing the folks around the waste disposal, the federal facilities, my impression because I dealt with this for years, but back when I was in the Congress continually heard from the representatives from those areas: Hanford and Aiken South Carolina.

In other words, just their abysmal relationship with the Department of Energy. How they felt they were just continually at odds with the Department folks. The thing that was pleasant and surprised me at Hanford was at least the testimony and the conversations we had with a number of people is that generally was not the case today.

Now, the problem was, and the one that Mary Olson has raised, is I didn't necessarily mean the deal is being kept, but at least at the local level the management teams of the Department appear to be much more

-- the Department seems to be much more sensitive to this relationship than perhaps they were in the past.

Perhaps they're allowed to do more things. Perhaps they've just had good people. I don't know. I don't know if that's an accurate characterization or not. I know it always will change with people and things of that sort, but I don't know if you can give us any insight if that comes close or not.

DR. WOLFE: Yes, I think it does. I mean for Savannah River, even though there's the disappointment I referred to earlier, I would still characterize the relationships between the field office of DOE and the community as being very good, very communicative. There's -- I mentioned the Citizen's Advisory Board on the waste management site.

MEMBER SHARP: It's just like the one that you folks have at West Valley. This is almost a standard way of operating today, isn't it? Or not?

DR. WOLFE: Well, many communities who have waste management, EM facilities, have citizens' advisory boards, I guess. But some are more active than others. Some are -- the ones at Savannah River frankly are populated by people who are pretty well experts in their fields, and they -- they know the questions to ask, and actually it's a very productive exercise.

But I think the situation -- I would characterize the relationship between both field office, and frankly we -- many of the community leaders make an annual trek up to Washington to EM headquarters as well. So, we are active. I've been there three times now, I think, in my last three years of going up to visit and talk about the issues that are of a concern to us.

So, I would describe the channels as being pretty open. We don't always get the decisions as quickly, or the right ones, the ones we'd like to see, but at least it's a fairly open process that we can participate in. I don't think anybody there feels like we're shut out.

MS. COULTON: I would echo the comments. I think over time, as you referred to, there's been personalities that do or do not click as well as maybe they should. I think over time, there's been issues with what you're getting from a site manager, versus headquarters and whether or not there's coordination between those two different levels.

As far as ECA, and specifically EM in this particular instance, we've just rated them an A on their outreach activities, and we've also been working with the Office of Nuclear Energy lately, and people seem to be feeling that the outreach efforts are there.

MEMBER SHARP: I don't mean to imply. Let me just give my comment and have you -- I didn't mean to imply things are all just hunky- dory, and we -- and leave it. But we may have learned something over the last 25 or 30 years in terms of that kind of communications, but that still doesn't get us to a structure that is able to make the persistent decisions that are both scientifically based and informed by the public.

I don't mean to imply that the public is not scientifically informed. Often times the best are among the public in that regard. But --

MS. COULTON: And just to add to that, I think that assured funding, something that is not based on the legislative year, that really helps. I mean if you have it institutionalized without swaying and changing, then you don't have to worry about it to the same extent that you do without something in place.

MEMBER SHARP: I realize this doesn't get at the kind of questions that you were raising of how do you get some of the basic information -- go ahead, yes.

MS. CURRAN: I would like to add a but. That is in my observation of the Yucca Mountain proceeding, where I represent a county government that has taken a relatively small role, but I watched the whole thing go by, the State of Nevada put in over -- I think it was something like 350 contentions, challenging the technical adequacy of the Yucca Mountain license application.

The DOE opposed every single one. Every single one. There wasn't one that they thought, "Well, that's worthy of a debate." And to the point that one of the judges gave a 20-minute speech saying, "I've never seen anything like this in my life," and he called the lawyers for the NRC staff the spear carriers for the Department of Energy, because they opposed most of them too.

So, there, where a party came in and said, "We are challenging you on these really specific things that have to do with protecting public health and safety and the environment," the DOE said, "We don't want to play with you." So, there's an example of -

MEMBER SHARP: What year or years was that?

MS. CURRAN: That was really recently. That was within the last year.

MEMBER SHARP: Okay. Well, I do - - not to defend, because there's no question that there are legitimate contentions people raise, at the same time, I think you can imagine being on the other side of the fence that the assumption is that once the state has taken the political decision it has taken, it is going to throw in the kitchen sink, the bathroom, everything they can finally get.

So, I wonder if they have -- and I'm not -- I don't know the facts here, but my suspicion is they may not have prioritized which things are really severe, and which are not. But maybe I'm wrong. And I'm not defending that the state is wrong, and the Department was right for not contending that, but one of the tragedies as we get into this is both sides are so convinced, they just will not open up.

MS. CURRAN: Yes, but I think --

MEMBER SHARP: They still have a responsibility. They have responsibility.

MS. CURRAN: But you're raising I think a good point. In the political process, there's a lot of contention, and both sides take an extreme position. You go at it.

MEMBER SHARP: Right, right.

MS. CURRAN: Supposedly the hearing process is like a formal dance, right?

MEMBER SHARP: No, I understand. I understand. Right.

MS. CURRAN: You can't even get a hearing unless you've got something to say. Unless you can describe your concern in writing, have maybe an expert opinion or a document to support it. So, it's not like they were just throwing spaghetti at the wall.

MEMBER SHARP: Okay. Now, I'm --

MS. CURRAN: And so, the idea that there wasn't one very carefully plead technical issue that the DOE saw some legitimacy to I think indicates that they're looking at it more as a fight.

MEMBER SHARP: Sure.

MS. CURRAN: And yet, this is the government which has a responsibility to deal with technical challenges, right? That's one forum to do it in.

MEMBER SHARP: I don't disagree with that. I also know that all these systems can be abused as well. And so, I'm willing to take a hard line on the -- the reason we set up the technical review board, and maybe it hasn't worked well, but was to try to force the Department as well as the -- that others had a place on scientific technical questions. I don't know about the others.

I can't debate this because I

don't know the facts at all. And you may be totally right. I don't wish to debate it. I don't know why I got myself down this -- that's not what I believe it or where I want to go.

MEMBER MacFARLANE: I'll extract you. So, I just want to go back to the question of the BRC, our performance, and how we can improve it or just -- I'm just looking for a little feedback, sort of midstream feedback. And I know a couple of you mentioned something, but everybody else got really into the communication question, which is really, really important. But if anybody else wants to add anything, I'd really appreciate it.

MS. OLSON: I'll just add briefly that I really appreciate -- maybe you all were going to do it, but I know you got some requests from various people. I really appreciate that this is going on the web. I really appreciate that there are transcripts.

I really appreciate that you've had a quick planning process to get all these meetings to happen, but that the times and dates have been disclosed.

I feel happy that you're hearing from many of my colleagues. I think as was echoed a moment ago, there is still a little bit of feeling -- I know personally, I was surprised when I actually received the bios. The degree of nuclear corporate connections, I mean not just nuclear field, but people that we thought were maybe kind of a little more neutral in their -- I'm not speaking of anybody in the room right now, but just -- just we're surprised the level of corporate connections of the Commissioners.

And I'll tell you that that, in terms of communicating in the broadest sense of like who we are, our reason to be makes sense with your title a nuclear future. Certainly very, very disappointment to many, many of us who -- well, I guess I'll just wrap it up by saying our only explanation is it's like Nixon going to China. It took a real capitalist to go to red China. So, maybe that's what it takes here.

DR. WOLFE: I guess what I would like to see as a major recommendation out of the Blue Ribbon Commission is simply what is our energy policy? And I know that's a --

MEMBER MacFARLANE: That's beyond our scope. I can't even -- I'm so floored by that. I just --

DR. WOLFE: Well, then don't define the energy policy, but recommend that we have one. I mean I think the --

MEMBER MacFARLANE: People have been doing that for a few years.

DR. WOLFE: I know, but I think one of the problems we have in going forward is we talked to -- you heard people the last couple of days talk about uncertainty. There is a lack of certainty for -- in a system that we have, where we are not an integrated, sovereign -- you know, we're not France, Incorporated.

We have companies that compete against France, Incorporated, and against Canada and against Russia and so on. So, if they are really -- if we go forward in this arena, or any arena for that matter, in terms of satisfying our energy requirements, and we don't have the certainty that the federal government will take a certain position relative to initiatives to accomplish the National Energy Policy, if we had one, then it's going to be very difficult to risk the kind of money that's involved in all these -- these initiatives.

And I realize that it's easy to say. It's easy to say, "We need a National Energy Policy," but I guess I'm hopeful that if we don't get that kind of leadership from the federal government that you may start to see regional efforts that start to formulate energy policy on their own.

That is to say that they will decide what things are good for them, and then pursue them.

MEMBER MacFARLANE: Other people --

MS. CURRAN: Yes.

MEMBER MacFARLANE: About the Commission?

MS. COULTON: I also want to thank you for inviting local governments and ECA to participate. But one idea is to make sure again that there's a designated individual, but that you send out those designated individuals to our meetings to the Energy Community Alliance.

We have regular meetings twice a year, minimum. But then we also have different specific issue meetings. And if those issues are issues that the Blue Ribbon Commission is looking at, it would be great if we invite you all; that you have the ability to send, whether it's Tom or one of the

Commissioners, someone to come to our meeting and keep you up to date as to what's going on.

MEMBER MacFARLANE: Yes, Tim can go.

MS. COULTON: We like Tim.

MR. FRAZIER: Actually, I wouldn't mind going.

MEMBER SHARP: Tim gets a salary. The rest of us don't.

MS. COULTON: Tim, you are formally invited.

MS. CURRAN: I just want to make one comment, and that is I was surprised when I heard of the existence of this Subcommittee, because I knew about the Blue Ribbon Commission. And then in my mind, I tried to make a connection between new nuclear plants and waste, and I thought, "Well, hey, that's good. They're asking this question that I thought should be asked a long time ago, which is why would you keep making more waste if you didn't know what to do with what you have already?"

And I think Dr. McFarlane, you just said we're not involved in energy policy. But I think you're kind of -- they've kind of got you by the ankle a little bit, because it's really --

MEMBER MacFARLANE: We're just not developing energy policy for the entire country. I mean the whole --

MS. CURRAN: Yes, but it begs a question as to, "Well, okay, so we made a mess, and we don't know how to clean it up. We have all these options in front of us as to how to go forward, and does it make sense to keep pursuing this one? Because if we can't really solve the problem, or we don't have any ideas right in front of us, it might take 100 years or more to figure it out."

So, I think that's really important, and I hope that this Subcommittee -- I wasn't sure whether this Subcommittee would be interested in the issues that I wanted to talk about, but I think they're relevant to what -- you know, the question of whether we should have a new generation of nuclear reactors is an important one in relation to the waste issue, and also in relation to the whole public participation issue, which kind of gets brought into that tangentially. That was my comment.

MR. BEMBIA: I would just echo Kara's comment about visiting some of the communities that are under consideration for new facilities, or that have been impacted. I think it's very important to the communities to know that people are hearing them.

CHAIR PETERSON: Diane, I have a question that goes back to what I think is a really important point that you raised, which is particularly post-9/11, although this has always been an issue that you have this conflict between security and safety, with the security part requiring some elements of secrecy that remove the level of transparency that really would be helpful in terms of allowing effective independent judgments to be made about infrastructure.

I think this is actually more pervasive across all of our infrastructure. People have similar concerns about information about chemical facilities and such. So, there's -- I think there's two pieces to that problem, and I'd like to get your reaction on how we treat the two different pieces.

One element is the existing infrastructure that we have, which is literally casting concrete. For example, I work in a building on the Berkeley campus, 300 feet from a fault that has a 50 percent probability inside my career of generating a magnitude 7 earthquake, and it is considered to be adequate for life safety in terms of the building.

And the State of California is bankrupt. We can't -- realistically, if I wanted to continue to -- but so, when we look at the energy infrastructure, then we have a baseload capacity system that is composed of a lot of coal, and modest amount of nuclear. And the policy decision you face with infrastructure is how much do you invest to replace the older stuff, and how rapidly? And as you do that, what do you get rid of first?

And when it comes to the question of coal versus nuclear, the existing stuff and how you should prioritize, I think that that's a really tough call to make. But the -- one of the liabilities with the existing infrastructure is the fact that from a perspective of security, we face this dilemma that security comes about from the combination of what the -- from the perspective of a terrorist deciding what to attack among all the different targets, they make the decision based on what they know about the facility, and usually that's obvious things: gates and other things.

And so, there's elements that are obvious: what they know/they don't know, which might be guard schedules or whatever. And then they don't make decisions based on what they don't know they don't know, but that affects whether or not they will be successful, right?

So, in general with our existing nuclear plants, we're relying a lot on the, "They know they don't know, and they don't know they don't know," part, and not a lot on the obvious things that make it difficult. Because the plants were never designed with these sort of security threats in mind.

So, you're sort of stuck with that problem. I know Allison sat as a reviewer on -- okay, maybe to discuss the existing ones.

MS. CURRAN: I don't think you are, in all respects, and this is an example of something that I've worked on with a couple of clients.

Okay, we have -- at every nuclear

plant, there's a spent fuel pool that is filled to capacity. And the way that you could eliminate the need to maintain a lot of secrecy about that would be to go to a combination of low-density fuel storage and HOSS, as Mary was talking about: harden on-site storage in casks.

And then you could tell the world, "This is what we have. You can't hurt this." Or, you would have to make it a good design, but you wouldn't have to have a big secret about what you've done to this pool, which -- my first FOIA case I ever had, the judge leaned over and said to the government, "It's my experience that if you go down to the corner bar, a lot of secrets are being discussed down there that everybody thought no one knew."

It's just hard to keep secrets, but you wouldn't need to in that particular case. But we haven't been able to get the government to do something about that, partly because they say, "Don't worry; we're talking care of it." But it's a secret.

CHAIR PETERSON: Okay, so actually, that's a very good example, and then you get to the next question. Well, if the government has made a decision of that sort, which many people question because legitimately you can; you don't have the level of transparency needed. How do you affect oversight to review that decision because on the other hand, it might actually be a, from a policy perspective, the correct one because of what you don't know that is a part of the protection, right?

MS. CURRAN: Well, that's the $64,000 question. And I think the public should be able to participate in that, and in the past was able to participate in that. If only by -- you could go to the public document room, look at the documents, evaluate them, and write to the -- you know, write a petition to the NRC, even if there was no licensing action going on.

So, it really is a problem now that there isn't a way to do that. And there is -- there is a group that does have access to the information, and that's the industry that's regulated, and that would like not to have to spend too much money in their view on it. So, I'm not sure how you resolve it.

CHAIR PETERSON: So, then in 2006, there was the National Academy study on spent fuel. Was it -- am I getting the dates right?

MS. CURRAN: Yes.

CHAIR PETERSON: 2006, and it reached a number of recommendations, which I think might or might not have been implemented or partially, or other things. Is it time for another study, or is that -- was that oversight approach of having an independent review by the National Academy sufficient?

MS. CURRAN: Well, on a spectrum of things, it's better to have some independent group review it. It would be preferable if neighbors of -- each facility is different, and the NRC issued separate security orders for every plant, and they said, "Each one is going to be different because of the characteristics of the plant."

So, what would be the best would be if groups, neighbors of facilities, could see the information, have the government perhaps hire an expert for them because these experts are expensive --

CHAIR PETERSON: Well, but if this is -- if this is legitimately classified information, could you have a member of the community who is given a clearance?

MS. CURRAN: You have to show a need-to-know, and then that's a question as to whether you could get the -- whether the government would approve your need-to-know.

CHAIR PETERSON: Okay. So, then clearly this would seem to argue that if you're going to build new infrastructure, it's better to have it rely more extensively on

security features that are much more
transparent, where -- because the costs of
doing it on the new infrastructure are lower.

So, I'd ask in looking at, say, the new reactor designs that the vendors have brought forward, do they give you more comfort with respect to physical security or -- or --

MS. CURRAN: Oh, no.

CHAIR PETERSON: Okay.

MS. CURRAN: No. For example, the aircraft crash analyses that the NRC is requiring for new plants, they don't have to be sent to the NRC. If they're not sent to the NRC, they're not subject to the Freedom of Information Act. So the NRC could send an inspector out to look at this stuff, at the documentation, but -- and sit there, I suppose, and make notes and come home with an evaluation. But as long as the NRC inspector doesn't bring the documents back to the agency, that information doesn't have to be disclosed under the Freedom of Information

Act, or any other law that I know of, to the neighbors or the plant.

That's been specifically designed that way so that the information can't get into public hands.

CHAIR PETERSON: Although in general for that specific type of information as to the specific design features, you would keep that information secure, as opposed to the fact that it would be engineered for a certain --

MS. CURRAN: Yes, but what if --

CHAIR PETERSON: In terms of thinking of what you have to protect and not in terms of --

MS. CURRAN: Yes, but what I'm saying to you is I'm not sure even in a closed hearing that the public could get it. Couldn't get it under FOIA for sure, okay? And a lot of information that is characterizes as SUNSI, if you request it under FOIA, you get it in my experience.

CHAIR PETERSON: Right.

MS. CURRAN: But, okay, supposing this information isn't SUNSI. It's -- or it's legitimately classified as SUNSI, the way the rules are set up is that it's -- it's very ambiguous as to whether the details of these things are ever going to be part of the licensing decision such that you could get them if you were a neighbor.

It's been -- it's been set up to kind of remove it from the public participation process. And I can get you -- if you want me to, I'd be glad to write it up and explain it to you how it works, because I think it's a pretty serious issue, the aircraft crash vulnerability issue.

CHAIR PETERSON: Understand. I understand. That's very helpful. The -- let me see. I have another question for Kara. You mentioned as one of the things that you discussed is important, local community function training and emergency response. And

I -- if you could, just give a little -- amplify a bit on that particular function, because clearly it's important both from how -- the -- the -- what the function does, and then also from how it affects local community understanding of safety and risks posed by having facilities nearby.

MS. COULTON: We were talking yesterday with one of our members, and she was telling us that around Richland, they only have funding for one emergency response planner. And I mean Hanford, you would expect maybe that there would be funding for more.

She said that's something we really have to get on top of. So, I think -- I think when the local communities are looking at where do they need funding to be able to do, what's the state's responsibility, what's the local responsibilities? Can it be shared? What's the relationship there? They need to make sure that at the local level, the emergency responders know what to expect.

I think she was speaking a little bit about WIPP shipments, and the extent to which people knew within the community, emergency responders knew, when those shipments were going, what were on those shipments, what their shipments were.

And sometimes, it wasn't good to know because you didn't want everybody to know. I mean the same thing that you guys have just been speaking about. Also, if there's an accident, are those people educated on what's on that shipment?

And so, local governments need to make sure that they've got the ability and the funding that they need to have everybody that needs to be trained, trained, and retrained, or if people are moving in and out of the community, that those things happen. If waste is going to stay longer, what kind of retraining do we need then?

CHAIR PETERSON: I think that that's a general observation, because emergency -- the reason I cued on emergency response is that actually many of the things -- - the elements of what you raise for safety and actually some substantial parts of security are good for the bottom line anyhow in terms of commercial interests because they increase reliability and other things.

Human performance measures, for example, can be -- programs are good for security and for safety. But there's other things where there's not an alignment of interests, and emergency response is one of those places where it appears you have to have some fairly firm commitments and oversight in regulation to assure that you'd get adequate capabilities in place.

I guess, Paul, that might be something else that you could comment on, and maybe others.

MR. BEMBIA: Yes. We do -- excuse me, we do depend on the local fire department, for example, to provide services for the West

Valley facility. They are -- they don't go through formal rad training or anything like that, but they do -- we bring them onsite every year, and we walk through all the facilities with them.

They are updated if there are any major changes to the facilities. So, they do know what to expect. We've also got our onsite responders, who are in charge of the emergency, and they work very closely with the fire department.

So, during shipments and things like that, there were some fuel shipments that went out from West Valley once, and the spent fuel was sent to Idaho, and that was very closely coordinated with all the states along the way. And I think DOE provided training. I think there was money for that through the DOE programs for emergency responders for that.

CHAIR PETERSON: Maybe just -- I have one final question that relates to sort of the interactions between local communities, NGOs and others, and facilities like nuclear facilities where one of -- one of the sort of modern inventions that has been implemented fairly extensively over the last 20 years is corrective action programs, which are systematic programs that identify -- where you encourage safety programs to identify problems.

You incentivize workers to -- to identify and report problems. You have a notification system. There is a systematic process that is supposed to work in order to -- to correct those problems, which includes things such as extent of condition to determine other similar problems, actually communicating information to other facilities around the country and around the world that might have similar issues and such, and also looking at whether changes in procedure training might be needed.

The -- the -- sort of the key

issue with making corrective action programs work, and actually if you look at statistics for -- various statistics related to nuclear power plant operation, it's clear that these have had a significant affect in terms of reliability.

But it's the social contract of accepting that you're constantly identifying problems, and that most of those will be categorized as having minor safety significance if one does not sort of enter into this contract as a regulator and as the public to tolerate the existence of the reporting of a large number of problems that what ends up happening instead is use of press reporting, and then worse things can happen.

Is there a way that we can sort of encourage or facilitate the application of this type of culture? Certainly, it's beneficial for nuclear, but also, say, medical. The medical area, for example, the most likely reason that you're going to die if you go into a hospital is because of a medical error. That is -- you're much more likely to die from a medical error than your disease.

So -- so -- and of course, if you think about it, there's all sorts of reasons why hospitals and doctors have incentives to suppress the reporting of any sort of problem, and therefore it's not surprising.

But is there something in sort of the communication within a local community that -- that -- or is maybe this just a matter of -- of trying to build enough trust that when you hear that there's problems in a plant, you're willing to accept that -- that if it's being well run, they're hopefully minor enough that you're keeping the reliability where it should be? Diane, I know you've --

MS. CURRAN: Well, it seems -- that's very interesting what you're saying, but I would think that an essential element of a social contract like that is that the playing field is even; that both sides have comparable access to information, and comparable resources to evaluate the information.

Because for instance, if you're the neighbor of a nuclear plant, and you get on the mailing list for the inspection reports, how do you evaluate those things? They come in your house every night, and if you don't have a degree in nuclear engineering, you read them, and you think, "Well, I don't know what to make of this."

So, you have to have somebody help you evaluate their significance, but it takes resources, and you have to have access to the information --

CHAIR PETERSON: Yes.

MS. CURRAN: -- so that it's really being reported to you, and you feel confident. So, it's like a chicken-and-egg situation, I guess. But then there's this other piece, which is that if there's some problems that you're not going to find out about because they are quote- unquote sensitive, then that undermines this contract.

CHAIR PETERSON: Yes, yes.

MS. CURRAN: So, I'm not really quite sure how you deal with that.

CHAIR PETERSON: Well, then also if you have any instances where you have an operator of a plant that deliberately covers something up, that leaves you suspicious about everything. That's -- that -- of course going back and reviewing everything is very expensive, which I think is one of the reasons why utilities are not as inclined these days as, say, back at the time of Zion, to -- to get into trouble that way. Because it's very expensive to dig out of a hole once NRC has concluded that you've been -- have not been completely truthful. Mary?

MS. OLSON: I agree that safety culture and communication go hand in hand.

CHAIR PETERSON: Yes.

MS. OLSON: And I understand what you're pointing to in our society about performance being the assumption that there is no problem, and I think that that is something that is largely gender-related to some degree, and one of the things that has been fascinating to me over the last 20 years is seeing more and more women get involved in this.

So, I'm hopeful that maybe some of that can shift, but I think ultimately the real question, and I'm going to bring this back to the Commission to Allison's question, if I might, is problem definition.

If you don't define certain things as problems, then they're not going to be addressed. And so, I would just like to invite the Commission to understand that if you don't squarely consider not making more radioactive waste as an expanded capacity of generation - I don't mean you're going to shut them down over night - I think you're going to have a little bit of a credibility issue. Because if that's not even considered as an option, then what was the problem you were addressing?

CHAIR PETERSON: I thank you. I take that point as, again, both to emphasize our recommendations are not going to have any element that recommends for or against, or for -- for generation of more nuclear waste or not. It will be about how to manage the -- the nuclear waste problem that we have, but that's a separate decision.

MS. OLSON: May I just point out that if there's any sort of sense that a whole new historical period is being embraced, there's no way that there wouldn't be expanded generation of the waste. If you're going to say that recycling is a good thing that's predicated on expanded generation.

There's a lot of ways in which you can fall in that hole. So, I'm just suggesting that you might want to really look at problem definition when you're talking about problems.

CHAIR PETERSON: Right, and also specific nature of recommendations that we would make, and whether they would endorse or not expansion or contraction of nuclear energy, or things of that nature. I take your point. Allison?

We've just run slightly over on our time. I think this is the point for us then to thank the panelists. I do look forward, if you could, Diane, to getting some additional information, and maybe the chance to talk a little bit more on this topic.

But I'd like to thank the panelists on behalf of the Commission, and this does end this second meeting of the -- oh, this does end this third panel, which leaves us with a short break, and we will be reconvening for public -- I came from -- yes, public comments.

Might I just say that first I

apologize, having come clearly jet-lagged from California. And second thing is could we have at least a five-minute break? So, we'll reconvene in five minutes for public comment. Thank you.

(Whereupon, the above-entitled matter went off the record at 3:03 p.m., and resumed at 3:13 p.m.)

MR. FRAZIER: Okay, we are in fact going to begin the public statement portion of the meeting. Everyone will get five minutes. I'll turn it over to you, Dr. Peterson.

CHAIR PETERSON: Thank you, Tim. I'd like to start with an apology. I sometimes feel on the last day of a conference on the last session, where sometimes you find that people who should be around seem to have departed. And so, I want to apologize sincerely to the people who are joining us to give public comments that -- that we only have -- that we don't have the full complement of Subcommittee Commissioners here.

We do have the staff here, and since I am a professor, I promise that I am assigning homework for our absent -- I don't know. The best I can do is give them an F as punishment. A D, okay. They can't repeat the course with the D.

Okay, so with that said, this -- this is all being streamed over the internet. It will become part of the transcripts, and it is important input into the public record of this Commission. And so, with that, I'd like to welcome the people who have come to speak to us from the public. The first is Kirk Sorensen. So, Kirk, if you could, come up and make your statement.

MR. SORENSEN: Thank you. Commissioners, it is my pleasure to participate in this meeting and address you today. Yesterday, there were a number of discussions on the nuclear fuel cycle. These seemed to focus on whether or not fuel recycles should take place, and if it does, whether it should proceed in a thermal spectrum reactor, like our light water reactors, or if it should proceed in a fast spectrum reactor, of which the most commonly discussed type is based on solid fuel, cooled by liquid sodium.

Another way to view these two options is that one represents the consumption of uranium-235, which is our only naturally occurring fissile material, and the other represents the consumption of uranium-238 and its derivatives, primarily plutonium-239.

Due to the specific properties of uranium-238 and plutonium-239, they can only be consumed in a sustainable manner, in a fast spectrum reactor.

There's another option that receives relatively little attention, but has compelling attributes, and that is the use of natural thorium in nuclear reactors. Thorium is fertile, and can be converted into a fissile nuclide, uranium-233 inside a reactor core.

Uranium-233 has the compelling attribute of being able to produce enough neutrons in thermal spectrum fission to continue the conversion of thorium to uranium-233 and then into energy.

Early in the nuclear age, it was realized that this special property had superlative value. Luminaries like Eugene Wigner and Alvin Weinberg worked to develop nuclear reactors based on liquid fuels. Research focused on a fluoride fuel formed, because it was the only appropriate liquid into which thorium could be dissolved as a true solution.

Weinberg's research and development program at Oakridge in the 1960s showed that it was possible to build and safely operate liquid fluoride thorium reactors. The fluoride fuel form is particularly compelling, since it represents the most chemically stable form of nuclear fuel.

In fact, all of our nuclear fuel goes through a fluoride form in today's nuclear fuel cycle, preparatory to enrichment. We know how to turn uranium oxide into uranium fluoride, and we do it everyday at conversion plants. Then we successfully use uranium fluoride in enrichment plants.

Many of these technological accomplishments are directly applicable to the use of uranium and thorium fluorides and fluid fueled reactors. Thorium's performance means that it's possible to build a reactor that once started on fissile material, requires no additional fissile input, and runs only on thorium.

This has profound consequences for energy future. For instance, if this small steel sphere represented metallic thorium, this would represent the volume of thorium that it would take to provide all the energy you would need in a normal lifetime in a liquid fluoride thorium reactor.

Fluoride reactor technologies can also be used to help solve our current nuclear waste concerns. Our spent uranium oxide could be fluorinated into a fluoride fuel form. Once converted, it is straight forward to move the uranium that comprises roughly 95 percent of spent nuclear fuel into uranium hexafluoride gas that could be removed and potentially recycled.

The same nuclear technology that allows us to use thorium could also be used to destroy plutonium while extracting electrical energy. Fluoride fuels would not require the long and lengthy fuel qualification program that solid fuels require. Fluoride fuels are impervious to radiation damage due to their ionic chemical bonds.

They do not swell, crack or undergo bold property changes, even under stronger radiation. The base fluoride can be used and reused essentially forever, by adding fuel and removing fission products periodically.

I encourage the Commission to strongly consider the potential benefits of using fluid-fueled reactor technology to solve our current nuclear waste concerns, as well as to open a bright, new energy future based on the effective use of natural thorium. Thank you.

CHAIR PETERSON: Thank you. Our next speaker is Rod Adams. His affiliation is with Atomic Insights. It's a well-known blog, and extensively read. So, Rod, thank you.

MR. ADAMS: Thank you for the opportunity to speak today. I publish the Atomic Insights Blog. I've been doing Atomic Insights in various forms since 1995. Today, I am on my last day as a US Naval Officer. Official retirement date is tomorrow. Submarine trained nuclear officer, served as a chief engineer on a submarine.

I'd like to take this opportunity

to remind you that nuclear energy competes against other energy sources, some of which are supplied by the world's largest, most powerful and richest companies. They have an economic interest in hampering and soiling the growth of nuclear energy.

None of the competitive energy resources are without risk. The overall supply of energy versus the overall demand for energy is what determines the price of energy. So, any new supply, say from an expanded nuclear power business here in the US, would drive down the price of energy, and reduce the profits for those large and powerful companies.

Some of the activists who have campaigned against nuclear have done so professionally for many decades. Economic competitiveness was discussed in one of the sessions earlier, and it's not just a matter of cost per kilowatt hour. In the energy business, there are other products and services that get sold.

For example, in a reliable, stable grid, the grid operator will pay an operator for what's known as reliable capacity. When the operator bids in for reliable capacity, if the grid operator needs them, they're there to provide it. If the reliable operator cannot provide, they get charged a penalty.

In the ERCOT, which is Texas grid, wind operators have been assessed that the maximum amount of capacity can bid in for this capacity payment is 8.7 percent of their nameplate capacity. Wind operators would love to be able to bid in and get capacity payments, but they also do not want to get charged a penalty when they fail to deliver because the wind stops blowing.

In some areas, wind developers -- I'm sorry. One man's cost is another man's revenue. When it comes to whether or not nuclear is an economic value and interest, the investors recognize that high wages and long-term assets that require continual maintenance are a cost to them.

Those investors love investing in 600 megawatt wind farms with a guaranteed rate of return of 113 -- I'm sorry, a guaranteed power purchase agreement of $113 a megawatt hour for 25 years, especially when under current tax law, the equity investors get returned their equity investment six to nine months after they make it in the form of an investment tax credit that gives them 30 percent of the wind farm development.

Predicting the economic value of an asset that's going to take six to ten years to put into service, and then run for 60 years is a dark art. Anybody who can say that they know that a nuclear power plant can't be competitive today has got a much better crystal ball than I have, and a much better crystal ball than all of the financial analysts who have recommended to utilities around the world that nuclear is a worthwhile investment as part of their balanced energy portfolios.

One of the issues that would -- the Blue Ribbon Commission needs to try to do is establish a predictable regime to allow people to make long-term investments.

Somebody mentioned today that secrecy causes problems from the opposition point of view. Well, from the point of view of somebody who supports nuclear, it causes secrecy for us -- secrecy causes a problem for us as well because the opposition can make up any story they want, and there's no way for us to counter if with good information.

One of the invited witnesses today talked about the acceptable rates of impacts, injuries, deaths from energy sources, and basically it seemed to us the acceptable rate for nuclear is zero. The competition has a different acceptance rate. The 50 percent of the US electricity supplied by coal is estimated to kill about 25,000 people a year early due to the effects of the emissions.

This year, in the first half of 2010, in the eastern part of the United States, so a very limited geographic area, three accidents caused the deaths of 46 people due to clean natural gas explosions. And I think my time is up. Thank you.

CHAIR PETERSON: Thank you for that statement. Our next speaker, a member of the public, is Lawrence Jacobson. He represents the National Society of Professional Engineers, or he's affiliated with the National Society.

MR. JACOBSON: I am affiliated with and employed by.

CHAIR PETERSON: Excellent. Thank you.

MR. JACOBSON: In this country, there's 4 million engineers. One-tenth of them, one in ten, is licensed. That's an important number. The National Society of Professional Engineers is grateful for the opportunity to comment before the Blue Ribbon Commission's Reactor and Fuel Cycle Technology Subcommittee.

NSPE supports investment in nuclear energy technology, green and renewable. Nuclear power will be an essential component of our energy future. The nuclear energy industry has an excellent safety record, thank in part to strict regulation, comprehensive safety planning and rigorous training and qualification standards for employees.

Nuclear power's great potential, however, is accompanied by the risk of disaster. Though unlikely, an accident at a nuclear facility could cause serious harm to people, their livelihoods and the environment. NSPE believes that any industry that deals with such great risk should require engineering plans to be signed and sealed by a licensed professional engineer.

Licensure serves to maintain and

acceptable standard of competence for the protection of the public's health and safety. When professional engineers seal plans, they are taking full responsibility for those plans. That's individual responsibility.

NSPE recommends that professional engineering services be used to help maintain the nuclear energy industry's strong safety record and minimize the potential for disaster. Thank you very much.

CHAIR PETERSON: Thank you for those comments, and I'm -- as a registered professional engineer, I appreciate very much your comments on the importance of registration. I think that every engineer should become registered.

MR. JACOBSON: The important thing is that the professional engineer reports to a higher power. All employees are responsible for their employer. They all have a duty of responsibility to their employer. But to also have a duty to the state, to the government to protect the public is a safeguard that is inexpensive, is prudent.

Why wouldn't we do that? Because if a professional engineer signs and seals documents at critical places along the way, we have a trail going backwards to find out what happened along the way from somebody whose responsibility is higher than their employment. We think that's the key piece.

CHAIR PETERSON: Thank you. Our final member of the public who will be speaking is John Kutsch. He represents the Thorium Energy Alliance. John?

MR. KUTSCH: Hi there. Thank you Blue Ribbon Commission. Thank you very much for having an open meeting. I know you didn't have to. So, it means a great deal to us that you're allowing us to come here.

As Per said, I'm John Kutsch. I'm the Executive Director for the Thorium Energy Alliance. Thorium Energy Alliance advocates for all uses of thorium. No one particular use is advocated, but we do have a preference, and we do favor the development of an MSR, or a liquid thorium reactor in particular.

The LFTR, or MSR, is a proven design. Several units were built and operated for thousands of hours in the `60s. This is not a paper reactor. This is a real design that operated for a long time.

LFTR has among its attributes, and it is for all intents and purposes a non-proliferating system, it can consume waste, so-called waste, runs at ambient pressure so it won't blow up. Little or no water is used in its cooling. So, it can be located just about anywhere.

Development of an -- development of an MSR or a LFTR could be justified, just in the fact that it can consume and degrade actinides. That alone is a reason to develop this technology. But this paradigm is shifting, and the technology is shifting, and we will not be creating this technology if we don't understand that there is an existential problem at hand.

We need to fund R&D in this area. There are three steps the BRC could take today or through their recommendation. I would ask the BRC to support the proposed legislation by Kit Bond to create a new domestic ability to refine rare earths and thorium.

When you mine rare earths, you also get thorium. So, when you get the materials you need to building electric motors and high energy circuits, you also get the fuel that will run them.

Step 2: Save the uranium-233. It is in a precarious position. It is set to be destroyed, and it is too precious to let that happen, and the BRC could have influence in this area if they recommended preserving it, instead of destroying such a valuable commodity.

Step 3: We must realize that time is of the essence. We do not have ten or 20 years to bring small reactors online and approve new fuel cycles. China will not be having a Blue Ribbon Commission of their own. Believe me. They will choose to pursue MSRs, LFTRs, small modular reactors as a business proposition, and once again, they will be shutting the USA out of an existing and emerging technology.

The United States of America created the technology and they will be selling it back to us, which is a crime. This is what has happened to, for instance, rare earths. China controls 99 plus percent of the rare earth production in the world.

Why is that important? Because when you make the rare earths, you get to decide who makes the magnets, who makes high energy circuits, who makes new integrated circuits. You get to control all the technologies that are built on that foundation.

So, we cannot let China or Japan

or South Korea or India, Norway, France, Brazil, South Africa, Canada, we cannot let these other countries be first movers in MSR, not again. This has happened before with photovoltaics, with windmills, with batteries.

These are all technologies we thought we'd build here, right? And now, who is building them? Other countries are building them in a much more efficient manner than us. And so, the BRC must get the leaders of the United States of America and its regulators to understand the existential nature of nuclear power issues.

United States' ability to compete in the world will suffer another major setback if we stick with business as usual, and I believe in your ability to make great good change happen. Thank you for letting me tell you a little bit about the opportunity that is thorium energy, and molten salt reactors, liquid fluoride thorium reactors.

And you can contact us any time at

ThoriumEnergyAlliance.com. Thank you so much for your time and all your hard work. If you care to, Dr. Hargraves, who spoke yesterday, wrote a fabulous set of articles with Ralph Moore.

CHAIR PETERSON: I think we may have copies, but if you can leave them with us, we'll make sure that we get those into the record as well.

MR. KUTSCH: Very well. Thank you very much for your time.

CHAIR PETERSON: Excellent. Thank you, John. Very good. At this point, I will call closed this second meeting of the Reactor and Fuel Cycle Technology Subcommittee. Thank you, everyone.

(Whereupon, the above-entitled matter went off the record at 3:33 p.m.)

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