UNITED STATES

NUCLEAR REGULATORY COMMISSION

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MEETING

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THURSDAY,

FEBRUARY 9, 2023

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The Commission met in the Commissioners' Hearing Room, One White Flint North, 11545 Rockville Pike, Rockville, Maryland, at 9:00 a.m. EST, Christopher T. Hanson, Chair, presiding.

COMMISSION MEMBERS:

CHRISTOPHER T. HANSON, Chair

JEFF BARAN, Commissioner

DAVID A. WRIGHT, Commissioner

ANNIE CAPUTO, Commissioner

BRADLEY R. CROWELL, Commissioner

ALSO PRESENT:

BROOKE P. CLARK, Secretary of the Commission

MARIAN ZOBLER, General Counsel

NRC STAFF:

DANIEL H. DORMAN, Executive Director for Operations

ROBERT TAYLOR, Deputy Director for New Reactors,
Office of Nuclear Reactor Regulation

BERNIE THOMSON, Deputy Director, Division of New and
Renewed Licenses, NRR

OMID TABATABAI, Senior Project Manager, New Reactor
Licensing Branch, Division of New and Renewed
Licenses, NRR

CANDACE DE MESSIERES, Chief, Technical Branch II,
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities, NRR

PROCEEDINGS

9:00 a.m.

CHAIR HANSON: All right. Good morning, everyone, and welcome. I convene today's Commission meeting to discuss NRC's strategy to license advanced reactors utilizing the established regulatory frameworks under 10 CFR Parts 50 and 52.

Advanced reactor licensing continues to be a topic of high interest to our stakeholders, almost everyone, so I thank you all for being here this morning to support this meeting, and I'm looking forward to a very good and informative conversation. Of course, we've had some experience now with these existing frameworks in Part 50 and 52, and I'm hoping we can also touch on some of the things we've learned as we've come along and those processes as well.

Before we get rolling, I'll ask my colleagues if they have any comments they'd like to make?

Okay. Without that, we will get rolling this morning. We'll hear from Caroline Ducros from the Canadian Nuclear Safety Commission. Welcome Caroline, and greetings to all our colleagues up north.

MS. DUCROS: Thank you. Good morning, Commissioners, members of the public. My name is Dr. Caroline Ducros. I am the Director General of the Canadian Nuclear Safety Commission's Directorate of Advanced Reactor Technologies.

I'm here to offer the Canadian perspective on licensing advanced reactors and SMRs and how CNSC implements technology-inclusive, risk-informed, performance-based regulation. I'll give an overview of the CNSC,

Canada's SMR Landscape, Readiness, and Collaboration with the NRC.

Next slide, please. The CNSC is Canada's nuclear regulator. Our mandate is to protect health, safety, security, and the environment, to implement Canada's international commitments on the peaceful use of nuclear energy, and to share technical and regulatory information with the public.

As this slide illustrates, our vision to continue to be a world class regulator involves four strategic priorities and outcomes, which include enabling innovation, like SMRs, through continued modernization of our performance-based regulatory framework, informed by experience with Canada's operating CANDU fleet.

CNSC shares and leverages best practices in nuclear safety and licensing, working with our partners like the NRC to enhance agility in our respective processes.

Our work is guided by our values, prioritizing safety, striving for excellence, acting with integrity, and building trust with indigenous nations and communities and stakeholders. These values that are shared by many like-minded regulators have contributed to Canada's strong working relationship with NRC staff.

Next slide, please. I will talk a bit about Canada's SMR Landscape. In the province of Ontario, we are reviewing an application for a license to construct, submitted to us in October 2022 by Ontario Power Generation, OPG, for the first grid-scale SMR using the GE Hitachi's BWRX-300 technology.

Also in Ontario, Global First Power, in a joint venture between OPG and Ultra Safe Nuclear Corporation, has applied for a site-preparation

license for a high temperature, gas-cooled, micro modular reactor. The license application review and environmental assessment are underway.

In Saskatchewan, SaskPower is exploring nuclear for the first time, working with OPG and GE Hitachi to deploy the BWRX-300 at up to two sites. Saskatchewan Research Counsel is also working with Westinghouse on the eVinci micro reactor.

And in New Brunswick, NB Power is working with two vendors and looking to site these technologies next to an operating CANDU reactor at Point Lepreau. ARC is developing a sodium-cooled fast-reactor, and Moltex is developing a molten salt and recycling technology for used CANDU fuel.

There is growing interest across Canada and multiple technologies, which is why CNSC is optimizing SMR readiness.

Next slide, please. CNSC has been preparing for nuclear for over a decade. The government of Canada recently invested $50.7 million Canadian dollars over five years to the CNSC to focus on the four pillars that are on this slide.

Capacity and capability is about our people, research, and technical skills, attracting and growing top talent in nuclear safety.

Regulatory Predictability focuses on optimizing our framework and providing further clarity to applicants as we continue to learn from first of a kind projects.

Policy and Shared Responsibilities recognizes that, while CNSC is Canada's nuclear regulator, there are other federal and provincial counterparts with related responsibilities. For this reason, the CNSC leads a whole-of-government approach to ensure SMR readiness across jurisdictions

and to build relationships.

In terms of international collaboration, as regulators, we can optimize our readiness by sharing experiences and moving toward harmonization where practical. Recognizing the independence of each regulator, we work collaboratively to enhance safety and agility globally. This is a culture change and challenge we will face. The MOC between the CNSC and NRC provides an excellent model for us to demonstrate how this can be done to the global community.

Next slide, please. The CNSC and NRC MOC, which was signed in 2019, focuses on cross-border matters and global deployment. We share research, training, and exchange staff. CNSC and NRC staff publish joint products catering to a wide range of end users and may serve as guidance for applicants or as the basis for acceptance by regulators worldwide.

In 2022, CNSC and NRC staff, with input from OPG, TVA, and GEH, developed a charter for collaboration on technical and regulatory aspects of the BWRX-300 reviews. There are three work plans underway: safety strategy, fuel qualification, and vertical shaft advanced construction using Steel Bricks.

Boiling water reactors are new to Canada, providing an excellent opportunity to leverage topical reports and certification of previous designs to complement CNSC's independent assessment.

Understanding each country's acceptance criteria for Safety Classification, Event Categorization, and Defense in Depth is the foundation for all collaboration.

Through our strategic plan, CNSC and NRC staff work

towards harmonization and demonstrate a model for collaboration that other countries can adopt. Internationally, we have shared our experience and lessons learned, and our work continues to generate interest.

Thank you.

CHAIR HANSON: Thank you, Dr. Ducros.

Next we'll hear from Mr. Marcus Nichol. He's the Senior Director for New Reactors at the Nuclear Energy Institute. Mr. Nichol?

MR. NICHOL: Yeah. Thank you, Chair Hanson, Commissioners, for the opportunity to speak to you today.

I'd like to convey an industry perspective of the state of advanced reactors and the regulatory framework to ensure the safety and security of that technology.

What we're seeing in the market is an increase in interest in advanced reactors for near-term and long-term deployment, and that's driven partly by policies to decarbonize the energy sector, but also in recognition of the need for nuclear for reliability and affordability.

NEI completed a survey of our members last year that indicated, collectively, they are interested in up to 90 gigawatts of new nuclear advanced reactors by 2050. We've gone and updated that survey and, while we haven't published the final results, it's increased by 10 percent. So, this underlies the importance of the regulatory system in the deployment of these advanced reactors.

The NRC, as everyone knows, has two licensing pathways today, Part 50 and Part 52, and is in the process of creating a third process called Part 53.

In relation to that third process, NEI and USNIC collectively surveyed our members, both developers and potential licensees, and 17 of the 21 members responded that they're not interested in using Part 53 because it's less flexible, predictable, and efficient than Parts 50 and 52.

So, that means that we need to have an increased focus on improving Parts 50 and 52 since they're expected to be utilized for the long-term, and certainly, they're the only options in the short-term.

So, turning attention now to the Part 50, 52 Lessons Learned Rulemaking that the staff has underway, we see and commend the staff for making many improvements to both Parts 50 and 52 through this rulemaking.

Just some examples: they're removing the duration and renewal requirements for design certifications. They're including change processes for standard design approvals. They are eliminating the need for Tier 2* information, and they're in the process of clarifying which large light water reactor requirements are not applicable to advanced reactors.

But we think that there are other significant improvements that should be made that are not being pursued by the NRC in the rulemaking. Examples of these: we would encourage the NRC to include a process for making changes to Tier 1 information at risk, before the NRC approves those changes, in a way that both ensures the safety and avoids the need for potential construction delays or huge licensing staffs to stand at the ready to process those.

Another would be the ability to issue COLs, or Combined Operating Licenses, referencing design certifications with known errors, with the provisions that those would be corrected in time and so that this doesn't

delay the issuance of those Combined Operating License.

Another one would be the establishment of first principles for Tier 1 and ITAAC information in order to right-size the content in those, because those are areas that are very difficult to change.

And then, we also noticed that there may be some things that are being included in Part 50 which we have some concerns about. And it's potentially the appearance that there are expectations that the construction permits would have equivalent level of design finalization as would be required in a Part 52 Combined Operating License.

An example of that is the level of completeness of the PRA, or Probabilistic Risk Assessment, and so that would blur the lines between the distinctions of Part 50 and 52.

We believe that these additional improvements are needed to increase the viability and ensure that there's distinctions between these two processes. They both serve different needs in deployment models that our companies are looking at doing.

You know, one of the things that we're seeing is a migration of interest toward using the Part 50 process, not the Part 52 process, which was established to be more efficient. And so, addressing these challenges would help to make both of these viable.

There are other efforts beyond the Lessons Learned Rulemaking that we think are very important to address.

So, one is to treat light water SMRs and non-light waters equitably. So, there are some instances where we're seeing differences in how they're being treated. So, for example, construction permit guidance is being

developed, one for non-LWRs and one for light waters, and we think there's a technology-inclusive approach that could be done there.

Similarly, target review schedules are shorter for non-light water reactors, and we think that the target review schedules should be similar because they both have similar philosophies in terms of enhanced safety.

There are examples where the NRC is doing a great job in treating things technology-inclusively, like the advanced reactor content of applications and certainly in Part 53.

We also think that key technical policy issues need to be addressed before submitting applications, and certainly, one of the most important things is improving the efficiency of the licensing process. So, to this, we recognize that that's important because there are new business models that are being pursued. We also see that there's a potential, real potential, for large volumes of applications in the future. And so, improving the efficiency is something that can both ease the potential for future workforce challenges as well as provide near-term benefits to applicants today.

Thank you.

CHAIR HANSON: Thank you, Mr. Nichol. Next we'll hear from Carrie Fosaaen. She's the Senior Director for Regulatory Affairs at NuScale.

MS. FOSAAEN: Thank you for inviting me today.

I was asked to speak about pre-application, and as a recent applicant under Part 52 for both a design certification and now a standard design approval application, I've got the perspective, unique perspective, of having done it once and then getting to see the lessons learned implemented in

real-time.

So, I wanted to start with just a brief summary, very high level, of NuScale's experience. NuScale first engaged the NRC on our design certification application around 2009. Before our submission of the design certification, we engaged in hundreds of pre-application engagements, submitted numerous white papers and several topical reports. We supported a gap analysis effort where we compared our design to the existing regulatory framework and ultimately supported the staff developing design-specific review standards.

We underwent a readiness review prior to our initial application submission at the end of 2016. Ultimately, that application was docketed in 2017 and, through a significant effort on both sides, was approved in late 2020. So, that represents the final safety evaluations.

In the meantime, we recognized we were going to pursue a power uprate, so we actually began engaging the staff in pre-application for the standard design application we recently submitted, and that started in 2019. In order to support this application, over 75 engagements -- so, you recognize that's a much more reduced scope.

We also went under a phased readiness review. So, again, looking at the way the design certification went, we applied lessons learned, and ultimately, we are currently waiting to see if the application will be accepted for review.

So, based on that history, I'd like to highlight three areas that stood out to me, one with pre-application meetings. The staff is only allowed to give informal feedback in a pre-application engagement meeting, which the

vendors, you know, use to be able to make decisions for business and move forward.

What we found is timing of those engagements is critical. Engaging too early with the staff, which is actually the staff's preference, resulted in a lot of uncertainty. You find that the staff may change, they get promoted, they retire, they move on to other assignments, and that informal feedback is sometimes unique to the staff member that you're engaging. So, timing is critical, and when we sought to engage more recently, we did keep that in mind, and that's why we did not engage more until the year before we submitted.

The other aspect is, I know there's a lot of benefits to pre-app and we certainly realize most of them, efficiency. Every one of those engagements represents resources on both sides, you know, both the vendor and the NRC, so being efficient in choosing what we engage on and what we choose not to, knowing that it's informal, you know, we pick and choose those topics very carefully.

And I would like to say, you know, we did see record time for our design certification, but when you look at the full scope of the picture, we started engagement in 2009. So, you could argue -- are you really making a more efficient review if you're just moving it into pre-app? So, just want to be mindful of how that's being executed in future applications.

Readiness reviews. We found a lot of benefit in the readiness review, but that is a highly resource intensive activity. Very complimentary of the staff. We proposed, for the standard design application we recently submitted, a phased review, and it was a novel approach. It came with some

challenges, and I recognize we put the staff in some interesting positions where, you know, by submitting chapters at different times, they didn't have the full picture, but I have to commend that they were willing to work with us on something innovative and try something new.

Again, with the level of resource and time, I think you'd find, for an optional process, the benefit has to be there, and for the design certification, we feel that the readiness review really led to our ability to be docketed and reviewed in an efficient manner. And that's really the benefit of doing a readiness review, especially if the applicant makes a good faith effort to address the comments provided by the staff.

And finally, I would like to talk a little bit about the risk-informed review. Again, to compliment the staff, they have been seeking opportunities to risk-inform the review, something I want to highlight that we're very optimistic about in our design review that we're coming up on.

And the staff, in order to support that, did do a probabilistic risk assessment of our design prior to submission, with the intent to really focus the areas they were looking at. As we haven't actually begun the formal review, I don't have conclusive results, but I want to highlight the efforts of the staff and say that we're very optimistic about seeing a risk-informed review.

That's something I think can really contribute to the efficiency of review, and with the number of applicants we've discussed potentially submitting in the near-term, efficiency is going to be key to those reviews.

Thank you.

CHAIR HANSON: Thank you, Ms. Fosaaen. Next we'll hear from Scott Hunnewell. He's Vice President for the New Nuclear Program at

Tennessee Valley Authority.

MR. HUNNEWELL: Thank you for the opportunity to speak with you today.

Next slide. The TVA Clinch River advanced reactor licensing strategy is to prepare and, upon TVA Board authorization, submit multiple applications that conform to a 10 CFR Part 50 two-step regulatory pathway.

The Part 50 licensing pathway would allow for the effective and systematic development of project licensing, design finalization, and construction. TVA believes that the use of the part 50 pathway provides the flexibility necessary to support potential design modifications required during construction.

A construction permit application requires only preliminary plant design and associated analysis. Preliminary plant design minimizes the amount of engineering work required to support an NRC decision that will allow construction to start.

TVA anticipates the design maturity to be approximately 30 percent complete for preparation of a construction permit application. An application based on partially complete information is something that TVA's licensing engineers are not accustomed to.

The operating license application contains the final safety analysis report. The final safety analysis report contains the information that describes the facility, presents the design bases and the limits on its operation, and presents a safety analysis of the structures, systems, and components of the facility.

Next slide, please. Next, I would like to highlight just a few

reasons why TVA believes the Part 50 licensing pathway will be the most advantageous relative to our planning for the Clinch River site.

In 2021, TVA completed a technology assessment that examined light water and non-light water small modular reactor designs. TVA's conclusion was that light water designs are most ready for commercial deployment and will support having a standard SMR option available by the early 2030s as one of several technologies to help TVA meet its goal for net zero carbon emissions by 2050. We believe the Part 50 licensing process can readily accommodate the light water SMR designs due to their similarities with previously approved designs.

TVA sees the potential for more timely and efficient licensing of standardized SMR designs in the future. However, until an SMR is licensed and constructed, the Part 52 process has the potential for time consuming and costly delays in getting to a first deployment.

TVA anticipates that, for a first of a kind deployment, there will be issues identified during construction that will require a change to the design. The Part 50 process allows the licensee to address the majority of any issues discovered during construction without prior NRC approval, which helps maintain the schedule and the budget.

TVA's assessment of licensing options for first SMR also identified potential risks associated with the Part 50 licensing pathway. These risks include that, to the best of my knowledge, it has been over four decades since a Part 50 was last used to license a new power reactor design.

The guidance updates for Part 52 removed Part 50 information. The difference in the Part 50 process is that NRC reviewers will

see a preliminary design rather than a final design needed under Part 52.

TVA's conclusion is that for the light water SMR technology, a Part 50 licensing approach provides many advantages and that the potential risks and any associated regulatory uncertainty can be mitigated.

Next slide. A regulatory engagement plan establishes rules of engagement between the applicant and NRC. The primary goal of the regulatory engagement plan is to reduce regulatory uncertainty by establishing such agreements as early in the regulatory process as possible.

Implementation of a comprehensive regulatory engagement plan can provide project stability and predictability in the full scope of activity, supporting the licensing process.

Early engagement between TVA and the NRC staff will be used to establish a mutual understanding of the application scope and to identify key areas of regulatory risk in the draft application.

TVA anticipates that pre-application meetings, site visits, and interactions that are well focused and have the appropriate technical experts will provide meaningful discussions to reduce regulatory risk associated with first-of-a-kind features, topics, and issues that are expected to be technically complex, unique, novel, or challenging from a policy perspective.

TVA will rely on topical reports submitted by General Electric Hitachi to improve the efficiency of the Part 50 licensing pathway, providing to the staff proposed methodologies, first-of-a-kind design features, and unique operational requirements early in the licensing process.

In conclusion, the Part 50 regulatory pathway is the preferred approach in licensing and constructing a first-of-a-kind advanced reactor

design. TVA believes that benefits afforded through Part 50 by the flexibility to make changes during construction of a first-of-a-kind advanced reactor design outweigh any regulatory risks.

TVA will work with the NRC staff, as we prepare the first construction permit application under Part 50 in over 40 years, to ensure that all parties involved understand that the construction permit application is based on a partially completed design. Thank you for your time.

CHAIR HANSON: Thank you, Mr. Hunnewell, and now we'll hear from Jamie Coleman, she's the Director of Regulatory Affairs for Southern Nuclear Company.

MS. COLEMAN: Thank you, Chair Hanson and Commissioners. I'm honored to have the opportunity to share Southern Nuclear's experiences with you today on the Part 52 licensing process during construction of Vogtle 3 and 4.

When I was preparing for this discussion, the biggest challenge was trying to condense 10 years of construction testing and startup activities into a few minutes, but I'll do my best. Next slide, please.

I'll first start with some observations regarding the advantages of Part 52. Part 52 met the aim of the original rule, which was to previous procedures for standardization of nuclear power-plants in early resolution of safety and environmental issues in the licensing proceedings.

Certifying the design on the front end enabled improved predictability on the back end through the ITAAC verification and closure process. Once SNC had submitted the final ITAAC closure notification, timely issuance of the Part 52 103(g) finding was possible because of the confidence

that the plant was constructed as designed which was proven through the ITAAC process.

In addition, having dedicated regulatory resources in both NRC Headquarters and NRC Region II was crucial in providing a central focal point throughout the course of the project.

Consistency in leadership and technical staff created a depth of knowledge that significantly contributed to getting the project to where it is now. In our view, NRC's use of dedicated regulatory resources for new construction projects constitutes a best practice and should be continued for potential advanced reactor licensing and construction if possible.

Next slide, please. I'll now share some observations regarding opportunities to improve Part 52 licensing process based on our experiences.

There is our scope identification during design certification phase, increased use of licensee self-approval processes, use of risk-informed processes, and changes to implementation milestones.

The scope, complexity, and challenges of a first-of-a-kind project of this magnitude requires flexibility on the part of the licensee and the regulator to deal with changes as they arise.

I'll start with the first two bullets because they go hand in hand. It's important to appropriately identify ITAAC Tier 1, Tier 2*, and Tier 2 scope during the design certification.

It is also important for the licensee to have avenues to make changes quickly through self-approval processes where appropriate. Either one or preferably both of these improvements would increase efficiency without

compromising reasonable assurance of adequate protection of public health and safety.

Through the ten years from issuance from the combined license to issuance of the 103(g) finding, SNC reduced the number of ITAAC, reduced the scope of Tier 2* information, and processed hundreds of departures from the updated final safety analysis report, or FSAR.

Today SNC has processed approximately 220 licensing actions in the forms of license amendments, exemptions, or alternatives, which is far more than operating fleets typically over a ten-year period.

Looking at SECY-22-0052, one of the NRC's stated goals is to reduce the need for request for exemptions from existing regulations and license amendments. Establishing a more refined scope on the front end and self-approval processes for changes would support achieving this goal.

Moving to the next bullet, Part 52 has not kept pace with the rest of industry's progress towards a more risk-informed approach in several areas. When a Part 52 licensee makes changes, they rely primarily on a burdensome, deterministic justification.

Where a risk-informed analysis demonstrates little or no risk, there should be a corresponding reduction in the necessary justification for the change.

When potential compliance issues are identified, NRC should employ a more risk-informed construction reactor oversight process and use of the very low safety significance issue resolution process. The same benefits NRC has cited for risk-informing Part 50 processes should also apply to Part 52.

Finally, a more recently realized area for improvement is in implementation milestones. The effective date for many regulations is tied to the date of the 103(g) finding, which is largely administrative and legal in nature.

In reality, not much physically changed on plant site when the 103 finding was issued, thus, no change to the risk profile of the plant. In SECY 22-0052 it specifically discusses changing implementation milestones for two areas, physical security requirements and fitness for duty requirements.

This is a good start but reportability and technical specifications also become applicable at 103(g). In the period between the 103(g) finding but prior to initial criticality, our experience has been that the application of these requirements has diverted staff and site focus.

Requirements should be phased in to minimize the unnecessary burden during startup testing when the site is working to ensure the plant will run safely and reliably.

Looking at the project holistically, our principal recommendation is to provide both the licensee and the regulator greater flexibility to deal with changes throughout the construction process, and thereby enable our collective resources to focus on issues based on their safety and risk significance.

I appreciate the opportunity to share Southern Nuclear's perspective with you and look forward to your questions.

CHAIR HANSON: Thank you, Ms. Coleman. Thank you all for your presentations. We'll begin questions this morning with Commissioner Wright.

COMMISSIONER WRIGHT: Thank you, Chair. Good morning.

So thank you for your presentations and I've really been looking forward to this meeting. In the past, we've had several meetings on Part 53.

As you all know, we were charged by Congress to look at a risk-informed technology-inclusive pathway for advanced reactors and so hopefully when that process is over, we're going to have something that's going to be both useful and usable by the stakeholders that use it and our Staff.

That said, though, as you all have mentioned, most of the applicants in front of us right now are those considering coming before us are using Part 50 or Part 52. NuScale, Kairos, TerraPower, X-energy, just to name a few.

So, it's important that we not be a barrier in this whole process to these new technologies. So, we're going to need to demonstrate that we're capable of licensing the new technologies and designs using our existing regulations.

So, to show that we can actually make safe use of nuclear technology possible, which is actually NRR's slogan. So, Part 53 can be informed by lessons learned if we indeed need it in the end, which I think you were referring to in your comments, Marc.

To me being a modern risk-informed regulator is more than just a motto or a slogan. It's going to have to be a behavior, it requires action and it's going to require our staff to answer the call to action which I believe they can do.

So, with that I'm going to ask my first question and I'll start with you, Carrie, since I name-dropped your company earlier in remarks. And given all the experience that NuScale has had with being the first SMR reactor

designed and certified.

Congratulations on that by the way. I want to delve a bit into the lessons learned letter that NuScale wrote a couple years ago. I think we can all agree there were several lessons, many of which the Staff presented in a report March of last year.

It brings to mind the SRM that we had on the IAB, the inadvertent actuation block valve issue, which was a big deal back then where the Commission directed the Staff to apply risk-informed principles from the usual prescriptive deterministic criteria such as single failure criteria.

So, I'm interested in an external perspective, your perspective, on where we might be as an agency right now, on how well the Staff has been implementing this direction, and if you or anyone else on the panel has noticed any improvements or differences since the Staff issued the lessons learned report?

MS. FOSAAEN: Yes, thank you. I would like to say I have seen some improvements, as I mentioned, in my opening remarks. The Staff is looking to implement risk-informed initiatives.

I would say in my observation that the SECY hasn't promulgated all levels of the Staff so we do see benefits at some levels of the organization but not all the way down to the bottom working level. So, that's my perspective.

COMMISSIONER WRIGHT: Anyone else? Marc?

MR. NICHOL: Thanks, I'd add to that. In response to the NuScale lessons learned letter and I know NEI had sent a lessons learned as well, we do see the NRC is starting to implement many improvements in the licensing process.

And they've had meetings to explain other improvements that are in the works that will not yet have manifested themselves. But we also note that there were some significant, we thought, improvements the NRC could make that are not being adopted that we would encourage the NRC to think about.

One is aggressive yet reasonable schedule targets. Today the NRC's review schedule is somewhere between three to four years. That's from the beginning of the safety review to the end of the safety review.

There's also pre-review processes, the acceptance review and the pre-application process, there's post-review processes, hearings, certifications, other things.

So, when you add all that up you're getting close to five years and that's a long time for an Applicant to be in the NRC process. So, we would encourage to try to get down as close to one year as possible for the safety review.

There is the definition of credible, which is really important. That term credible for accidents is used over and over and over again and a lack of understanding of what the NRC means by credible makes it difficult for industry to try to meet that definition.

The SRM-SECY-19-0036, we've asked on occasions, how are you implementing that, and we've not heard any response. We've not seen any indication that that is actually being implemented. There's others but please continue.

COMMISSIONER WRIGHT: Anybody else? Speaking of the IAB valve, one of the recommendations from the report I believe the Staff should reconsider is a clearly defined process-resolved disagreements.

I understand there were considerable resources expended when they had technical disagreements that maybe could have been resolved sooner had you had a process in place to seek alternative safety perspectives.

And we've got a number of those things now in other areas for internal and external stakeholders, differing professional opinion program being one of them. There's even a documented agreement in the MOU between us and the CNSC that gets to that.

So, what would be your thoughts on that type of a process being implemented?

MS. FOSAAEN: I would be very supportive of it. I am aware that for our standard design application, we are working with the Staff currently to implement an independent reviewer. I haven't seen documented what that process looks like, it's only been verbalized.

But I think that's something that's been encouraged and the Staff understands. One thing we've come to agreement on is the need to escalate quickly. So, having that third-party independent reviewer would help facilitate that disagreement period.

Because I think on both sides you've got reasonable people with different opinions, much like you can expect. So, it's possible and very likely you'd have different opinions of the ultimate outcome but I'd be highly supportive of it.

COMMISSIONER WRIGHT: Good, thank you. We've got about three minutes left, so I'll see if I can try to get two questions in here.

Jamie, welcome. Having the first plant to use Part 52, I'm kind of interested in the additional insights you may have on efficiencies with current

our regulatory process here with Part 50 and 52.

Hypothetically, if you were to build Vogtle 5 and 6, talk to me a little bit about whether you would take the same path under Part 52 or would you consider Part 50, and maybe why?

MS. COLEMAN: Thank you for your question. I expected this one.

COMMISSIONER WRIGHT: Did you?

MS. COLEMAN: I would want to know the answer to this. I can't speak for what direction Southern Nuclear would choose because there's a lot of variables and I think some that were highlighted today is the percentage of design that's completed and is it a first of a kind or have there been others ahead of it?

My personal opinion if we were going to build additional AP-1000s that Part 52 would certainly be a viable option because we have exercised it. And one of the things that is still yet to be unseen is that Part 52 was made for a reference plant and then standardization following it.

And we've seen changes and we've seen efficiencies in Unit 4 but most of those have come from changes that we made on 3 that we did for 4 as well and it made sense to do so. So, we haven't really fully seen the benefits of having a reference plant and other plants to follow.

But I think 52 would certainly be viable.

COMMISSIONER WRIGHT: Thank you for that. My final question is going to be for anybody at the table here. What do you see as the biggest regulatory hurdle to licensing technologies under Parts 50 and 52? Is it being addressed? And if not, any thoughts on how to address it?

MR. NICHOL: I'm happy to answer that. I think there's many things to address and the NRC is addressing many, many of them. But the biggest one I think should be addressed right now is the efficiency of the processes, especially the review process.

I talked about the five years and trying to get that down to something shorter. Not only does it help industry and time to market but it helps the NRC in terms of the resources that you have to apply.

And so when we talk about a more efficient process we're not talking about cutting back on safety. We want the same rigor in the review and the same safety outcomes. What we're looking at is how can you do it more efficiently, approve safe designs more efficiently?

COMMISSIONER WRIGHT: Right, it's saving resources on both sides. Thank you so much.

CHAIR HANSON: Thank you, Commissioner Wright. Commissioner Caputo?

COMMISSIONER CAPUTO: Good morning, thank you all for being here. Given the challenges with Part 53, this meeting is incredibly timely and I think it certainly has crystallized my focus on the proposed changes for 50 and 52 through this rulemaking.

Mr. Hunnewell, you discussed in your remarks the fact that TVA is choosing Part 50 for Clinch River because of the greater degree of flexibility it provides, especially for changes during construction and particularly for designs that are first of a kind.

One of the proposed requirements, requirements proposed by the Staff, would be to include the requirement for a probabilistic risk

assessment for a design and the results of that assessment as part of a construction permit application.

So, Mr. Nichol and Mr. Hunnewell both, how does that limit that flexibility during construction? Because as we heard from Ms. Coleman, 220 licensing actions during construction, if a PRA has to be revised with any number of those actions and those revisions to PRAs were reviewed at the same time, that's going to add a fair amount of review time and complication.

What are your thoughts on that situation?

MR. HUNNEWELL: I would say that requiring a PRA for the construction permit application would negate the benefits from a Part 50 application. Because with a 30 percent design, you don't have enough analysis to prepare a PRA.

So, that design would have to be matured significantly before you could prepare a PRA and then you could possibly have those impacts of changes during construction. I don't think that's practical in a Part 50, 30 percent design application process.

MR. NICHOL: I'll add to that. There are two primary benefits that were built into Part 52, one was finality at the approval before construction, the other was -- and then the distinction with Part 50 is that you can submit the design with less design completion.

As so as Scott just pointed out, requiring a PRA essentially requires the exact same design completion as a Part 52 combined operating license. So, you have all of the same burden of proof but you have none of the benefits of finality.

COMMISSIONER CAPUTO: And so I'm guessing that while that

might be less of an issue for a more established design like the AP-1000, that's going to be a particular challenge for novel advanced technologies?

MR. NICHOL: It is. One of the reasons why people are looking at Part 50 is because it can be a faster process to get to market because you're submitting your design with less design completion and you're completing that design in parallel with construction.

And so if you require that PRA, then you've negated the benefit of time to market.

COMMISSIONER CAPUTO: Thank you. Mr. Nichol, I'm going to stay with you for another question getting at applicability.

One of the challenges I think for novel designs in proceeding through this rulemaking framework is these frameworks were envisioned for light water reactors so there are clearly going to be segments of our regulations that aren't really applicable for advanced technologies.

The question is how do we give clarity for applicants on what's applicable and what isn't applicable so that it can file complete high-quality applications?

There's a white paper on the subject, but how do you envision or what do you see in terms of progress with getting clarity and some measure of certainty and reliability to support drafting of applications?

MR. NICHOL: This rulemaking is critical, to get that clarity on which of the large light water reactor requirements apply to advanced reactors. The papers you mentioned, we had a lot of discussion with the Staff, they ultimately came back and said this can only be done in a rulemaking.

And so they are incorporating this into the rulemaking so it'll be

very important to look at the details, to what extent are they going to disposition all of those large light water reactor requirements.

COMMISSIONER CAPUTO: Now, the differences between designs may alter which regulations are applicable. How do sort through that in a rulemaking?

MR. NICHOL: There's a couple of ways to look at it. You could look at some that are clearly not applicable to anything except large light water reactors. There are others where you could come up with some performance-based criteria that you would then judge the design against.

So, if you have the criteria you could look at the design and say, well, I meet the criteria and therefore it doesn't apply to me or I do not meet the requirement and therefore it does apply to me.

COMMISSIONER CAPUTO: Thank you for that. Carrie, thank you for being here. I have to say your discussion on risk-informing definitely piqued my interest. One of the things that jumped out at me from your lessons learned letter was a threshold for a design basis source term event.

So, I understand that we're about to receive -- this is something the Staff has wrestled with in Part 53 that I expect we will continue to wrestle with in this rulemaking as well but one of the items has to do with including quantitative health objectives in Part 53.

However, what we saw in NuScale's lessons learned is the numbers seem to go even lower than the QHOs of once every two million years, including consideration of an event that happens three times every ten billion years.

I'm kind of struggling with how we got there because -- and this

is where I have to put a number like that in context. Astronomers estimate the earth is only 4.6 billion years old.

So, when we start getting into numbers like this I struggle, and yet, in your remarks you talked about being optimistic about a risk-informed review. So, between your lessons learned letter to us and the remarks that you've made today, what has changed in terms of our ability to be risk-informed and what progress or challenges do you still see in terms of how we are looking at what constitutes a credible event?

MS. FOSAAEN: That's a great question. I guess I'd start with I'm always an optimist so I can start with that. But I mentioned the effort the Staff went through prior to our submission. It was their idea looking at what we've done with them, let's look at your PRA so we can focus our review.

That wasn't something we had in the design certification so my optimism is spawned by some of the behaviors I'm seeing in the engagement between the design start and now. I do think there are still going to be challenges.

The definition of credible, as we alluded to in our letter, not having that clarity leaves a lot of space for interpretation. I think the SRM you issued on our IAB, our inadvertent actuation block, was a great first step.

I'd like to see that more infused into the processes. I think that's one thing that there's room for improvement, to continue to embrace that philosophy. And that would be the challenge, how do you define something?

Because there are so many different technologies but I would question does it really matter what the technology is if safety can be established at a certain threshold?

Because as you alluded to, we're talking about probabilities that are very hard to grasp and I think that's part of the challenge.

It's how credible, and incredible in a different sense, but how much can you trust the numbers when they're that low? And that's something we run into with the Staff, is that's so low how can I believe you?

COMMISSIONER CAPUTO: So, Mr. Nichol, given how we're considering a range of technologies that are going to be coming our way, how do we create within that definition of credible event – how do we create clarity, certainty, and reliability that we know what the definition is and that it will be constant and that it will be reliably applied to a range of technologies and subsequent applications?

MR. NICHOL: I think the answer is in creating a performance-based metric to compare it to. And the performance-based criteria should be directly related to public health, protection of public health and safety. And so that comes down to doses.

And so looking at a consequence-based approach first and then looking at, well, what types of risk insights do we need to apply to that? I would not say it needs to be a quantified PRA number because then that goes into some of the concerns we have with Part 52.

COMMISSIONER CAPUTO: So, however consequence-based differ from the Staff's approach of using the quantitative health objectives approach in Part 53?

MR. NICHOL: I could point to the rulemakings - SMR emergency planning zone and the SMR security rulemakings that are more consequence-based that focus on the consequences and the dose with

appropriate risk insights, not using probabilistic risk assessment metrics.

COMMISSIONER CAPUTO: Ok. Thank you. Thank you, Mr. Chairman.

CHAIR HANSON: Thank you, Commissioner Caputo. Commissioner Crowell?

COMMISSIONER CROWELL: Thank you, Mr. Chair. Thank you all for your presentations today. As the newest Commissioner, this has been illuminating for me in a variety of ways.

I'm still struggling with the construct that NRC has created between traditional reactors and advanced or new reactors when the more I learn about this, I really think it should be a discussion of light water versus non-light water technologies and how we approach the issues.

That being said, I'm going to try to get to all of you with some questions, starting with Ms. Coleman.

Based on your experience with the AP-1000s at Vogtle 3 and 4, if Southern or even another entity were to look to move forward with an AP-1000 design, how much confidence do you have that the process would be quicker based on the experience that the NRC Staff has gained from Vogtle 3 and 4?

MS. COLEMAN: Thanks for your question.

There have been actions taken based on the lessons learned at Vogtle and I'm not sure that anybody has exercised those fully yet around the license amendments and self-approvals and some of the things that I spoke about in my remarks.

So, some of the lessons learned are already out there and

they're already being worked on and moving forward there are things that are new that I talked about, with the implementation milestones, that we're just realizing now.

So, for others kind of behind, we have to continue to bring these topics forward as we learn more, as we grow, making changes along the way and not only for future but for the organizations who are in the different design phases.

So, some of the lessons learned didn't get applied back to Vogtle because we already had our license but the pursuit of getting better, learning more, is going to always be there.

So, we've got to have a process for incorporating those lessons learned as they come and making them available for current applicants and future applicants.

COMMISSIONER CROWELL: Thank you. Mr. Hunnewell, I believe in your presentation you said that Part 50 is best for first-of-a-kind advanced reactor designs?

MR. HUNNEWELL: That's correct.

COMMISSIONER CROWELL: And did you mean that to apply to both light water and non-light water advanced reactor designs?

MR. HUNNEWELL: As we assessed it for our application, we determined Part 50 was best and we're looking at Gen 3 reactors, so we didn't directly go look at the Gen 4s in terms of Part 50 versus 52.

COMMISSIONER CROWELL: So, in layman's terms, you see Part 50 as best for light water advanced reactors?

MR. HUNNEWELL: That's correct.

COMMISSIONER CROWELL: Thank you. Ms. Fosaaen, thank you for being here today. I want to make one comment about your presentation so it doesn't get lost about early engagement opportunities and knowledge management. This has been a topic for a lot of us, Commissioner Caputo particularly.

It's a concern that we're having that the pre-engagement process is undermined by the lack of good knowledge management. And I just want to make that point here today so that we can hopefully get better on it internally and make use of those pre-engagement opportunities. That being said, how familiar are you with the draft of the Part 53 regulation?

MS. FOSAAEN: As we are currently engaged in Part 50, I'm only vaguely aware. We do follow it to look for opportunities to leverage concepts if they were to be implemented. But I'm not intimately aware of all of the details.

COMMISSIONER CROWELL: I ask just because I want to make my next question fair and if you don't feel like you don't have the depth of knowledge, feel free to defer.

If you had to start from scratch for NuScale and Part 53 was in place, would you look to use Part 53 or would you stick with the 50-52 framework?

MS. FOSAAEN: As it currently stands, we would stick with Part 52.

COMMISSIONER CROWELL: That's notable, thank you. Mr. Nichol, for your stakeholders, particularly the ones looking at advanced light water designs, are you hearing they're likely to use Parts 50 and 52 or are they

looking forward to Part 53?

MR. NICHOL: I'll preface by saying I don't think the issue is with the distinction between light water SMRs and non LWRs. I think that distinction is actually causing challenges today. But for whether it's light water SMRs or non LWRs, most are looking at using the Part 50 process.

Now, I'll preface it by saying when Part 52 was developed, it was intended to be the best, newest process. In fact, there was some discussion on should we even continue to allow Part 50 for new reactors because Part 52 was supposed to be so much better.

The trade-off that was made is that in Part 52 you could get finality of NRC decisions before beginning construction and the trade-off was that you would have a little bit longer time to market because you couldn't do parallel design with construction.

But now what we're seeing with the challenges of Part 52 is that it's very difficult and very resource-intensive to make changes during construction. That was never the intent of Part 52. And so a lot of lessons learned are going to address that.

There are other lessons learned we think are needed to be able to fully address that so that statements about Part 50 is the only way to license a first of a kind. Those shouldn't be true statements, in my mind.

In fact, if that is the facts of the current state of the requirements, then I think we should not convince ourselves that Nth of a kind are going to have it easier.

Nth of a kind will still have changes in the design during construction and so if we don't address these problems to enable first of a kind

in Part 52, I don't think we'll ever find Part 52 to be much more viable for other Nth of a kinds.

COMMISSIONER CROWELL: So, even though Parts 50 and 52 really grew up based on light water technologies, you still see those two applicable to non-light water technologies without having to use more exemptions than make sense?

MR. NICHOL: So, Part 50-52 is difficult even for light water SMRs and the reason is I say I don't distinguish between LWRs and non LWRs is because if you look at them from a safety performance basis, they're both incorporating features that enhance safety: higher margins, elimination of accident sequences, better mitigation.

They're both coming out with the conclusion that you might be able to do site boundary emergency planning zones, you could probably not have to rely on safety-related emergency diesel generators.

So from a performance base, they look almost identical. Now, how they get there is very different, so there are technology differences and we think those should be addressed in guidance.

So, yes, there are challenges even for light water SMRs using 50 and 52 technical requirements and that's what Part 53 is intended to address.

COMMISSIONER CROWELL: Thank you. Many of your member companies operate in states currently or plan to operate in states with carbon reduction goals. There's also national carbon reduction goals. Do you think that the current Part 50 and Part 52 or the proposed Part 53 can be timely enough to meet those production goals?

MR. NICHOL: I think we need robust changes beyond what the

NRC is looking at but, yes, with significant improvements in the efficiency and timeliness of licensing decision-making, yes, they can support the market needs.

COMMISSIONER CROWELL: Dr. Ducros, I think we have a lot to learn from the Canadian experience here and one of the places I think we have a lot to learn is in the public engagement space and how broad and robust of a public engagement undertaking the Canadian model includes.

To the extent you're familiar with how we do that here in the U.S., could you give us any highlights of places we could improve our public engagement that's built on your experience? And you can say anything and it's going to be appreciated, so be free to be candid.

MS. DUCROS: Thanks, that's a difficult question for me to answer in terms of how you can improve; the contexts are quite different.

What I could say is what we have found in our lessons learned is that there is an onus on the proponent or the applicant to make sure that they have reached out very well to the community, and in our context, indigenous communities and nations to ensure there is some level of public buy-in.

From the Federal Government perspective, we try to get up there early but I heard earlier too early is sometimes not necessarily beneficial. You have to have enough to speak about.

We're still learning, we're using as many platforms and mechanisms as we have. With COVID, we found the virtual platform to be really beneficial in terms of we get way more people out. But there are some meetings that definitely need to be had in person if that's possible.

And I would say with indigenous communities, face to face is

almost always the preferred option. And what we're noticing with the license review that we're going through right now with Ontario Power Generation and the BWRX is we're building in workshopping of different technical topics.

So, I can't say whether or not this is different from the U.S. context but these are the things we've noticed work well.

As much transparency as possible ends up with a better result when we appear before the Commission because there should be no surprises and basically, that's the key.

And also, that engagement has to be two-way. We have to have a real open heart and open mind to what is being put before us and the concerns of the public and indigenous communities and nations, and to treat those fairly.

COMMISSIONER CROWELL: Thank you. I take your point and I hope we all do given the complexity of these topics, as we've discussed today. With the historic distrust in many areas of commercial nuclear, I tend to think more is always better in this regard.

Thank you.

CHAIR HANSON: Thank you, Commissioner Crowell. Dr. Ducros, I'd like to stick with you if I can for just a second. I think I'm going to try and extract some themes, if I can, of the conversation that's happened so far among the presentations.

One of the things I heard, and we on the Commission have been having this discussion but the spectrum of predictability versus flexibility and that one of the advantages of a 50 or 52 approach for new reactors is that it is kind of an established process.

But I'd be really interested to hear how the CNSC is approaching that issue about regulatory predictability versus flexibility in evaluating new technologies.

MS. DUCROS: Thank you. What I would say is going back at least a decade, we went through all our regulatory framework documents and those are the documents that elaborate what the requirements are in the regulations under the Nuclear Safety Control Act to make sure that they were very CANDU-focused.

So, to go back and make sure they're technology-neutral and what this means is there could be a level of a graded approach when someone comes in, but how do you provide the clarity of what do we mean by a graded approach, what do we mean by risk-informed?

And we're trying to elaborate that going back to some of the regulatory documents to provide a little bit more clarity on that. The flexibility versus predictability is an interesting one.

Because regulatory documents only come up for renewal every five years, one of the things we're really attempting to do is work very closely with potential applicants to provide some sort of clarity.

And what we can put on our website might be a one-pager, a fact sheet, describing what our expectation is. So, we do have a mixture of prescribed and performance-based regulations and sometimes it is prescribed.

But if an alternative can be proposed to us that's very well justified that would result in a neutral safety or better, then that is an acceptable alternative to us.

CHAIR HANSON: Interesting, thank you, I really appreciate that.

Graded approach, mix of prescribed and performance-based, very helpful, thank you.

Mr. Nichol, one of the other things that I had picked up was about what does it mean to be risk-informed and sometimes the way we approach that has been in a PRA where in some cases we may be equating being risk-informed with the use of a PRA.

But as we go about building the regulatory infrastructure, if you will, and I agree with the need for efficient licensing reviews of these new reactors, do you have or does NEI have thoughts on additional areas?

And given that we've got limited resources, not only in the monetary sense but just in the brain power sense, of areas for guidance development that we could or should focus on and whether NEI is looking at those areas where you are developing potential guidance documents to put in front of the Staff that help achieve the overall safety goals while still achieving the balance in the areas we need to achieve?

MR. NICHOL: Thank you for the question. I think the NRC is doing a good job in addressing most of the major key technical policy issues and risk-informing those. I mentioned the SMR emergency planning zone, SMR security, population siting.

There are many like that that Staff is already embarking on. And I'll note that a lot of those are being risk-informed without the prescriptive use of PRA numbers to be able to justify it.

So, certainly the PRA will be informative and useful when the designs try to meet those performance standards. But the performance standards are not being written in terms of quantitative PRA results.

I think where we go from here, the next frontier of risk-informing is going to be in the construction and operation space, specifically looking at what are the construction oversight programs, what does it look like, what does the reactor operating oversight program look like?

The ones that we have for the large light reactors, just like the other policy and technical issues I mentioned, are not the best fit for these advanced technologies. So, we need to do that same type of thinking for those areas.

CHAIR HANSON: Thank you, that's really helpful. Mr. Hunnewell, I'll ask you the same question. You had brought up I think there was a discussion about the difficulty of using a PRA in Part 50 for a construction permit.

I'll ask you the same question about additional guidance that can potentially help risk-inform but also mitigate any licensing risks in Part 50?

MR. HUNNEWELL: There are probably a couple of things as I think through the Part 50 application. When I think about risk and risk during construction until such time as you have nuclear fuel on site, the risk is really with the applicant, right?

It's a financial risk until the NRC has the opportunity to review that final application. So, there may be an opportunity to look at that. What are those things that really need to be reviewed during that construction permit?

Because it is a partial design but which of those, perhaps because of such significant safety significance, the NRC would want to see more developed so that the final design would not be deviate much from that and it would be understood, if that makes sense.

CHAIR HANSON: I think so, thank you very much.

Ms. Coleman, I'd like to finish up with you. I thought the discussion you noted in your presentation, recent guidance updates focused on Part 52 and that's a potential licensing risk.

Sorry, this is the wrong question. We were talking about risk-informed processes during construction. Do you have thoughts on how a 50.69 process or a 50.69-like process, if available, may have addressed design changes during construction?

MS. COLEMAN: Certainly. I gave a pretty big number of licensing actions that we have had and part of that I think is because there was so much detail in the ITAAC and there was so much scope and specifics – numbers - and things that we just had very, very little margin to work through.

So, if you have a 50.69-type process that you could apply, it would give you I think more options to address issues.

Because maybe during a certain timeframe we didn't have time to get a license amendment or something like that, you're kind of forced to go a certain direction when maybe there's other options that are less impactful for resources and time.

And you don't have those available to you because you have to go and have pre-approval, which takes time to get. And I would say the number of days for the 220-ish licensing actions is variable, some of them a year, some of them half of year, it just kind of depends.

But certainly, there were things that were not safety-significant that we were required to submit for pre-approval.

CHAIR HANSON: Thank you. Is there any thought or comment

you would want to make about use of PRA? Usually, we approve a licensee for use of 50.69 because they've done a PRA on their current plant and operations. 52 might lend itself to that because of the completeness of design, but would you like to comment on that?

MS. COLEMAN: You're asking about 50.69 and I went 50.59. Sorry.

CHAIR HANSON: It's okay, as of yesterday at 4 o'clock I was a little confused about that myself.

MS. COLEMAN: I apologize, 50.69, yes, we certainly could use PRA in those applications. Like I said, we're learning as we go, we're finding we've had some supply chain issues during this process due to the pandemic and things.

50.69 even lends to the equipment that you bring in and safety significant and non-safety-significant. So, we can certainly apply PRA and 50.69. I do think we need to go further than just that piece but certainly, that would help.

CHAIR HANSON: I won't ascribe it to confusion but the relationship between 50.69 and 50.59 in that process is actually kind of an interesting one that might be worth looking at.

A formal review and evaluation process versus something that is a little more, I don't want to call it less formal but less prescriptive in a way. So, thank you very much. Commissioner Baran?

COMMISSIONER BARAN: Thanks. Thank you all for being here and for your presentations, I think it's been a good discussion. I'm trying to figure out what it leaves me to ask about. Maybe, Jamie, I'll stick with you for

a minute.

Our inspectors have been interacting with site personnel at the Vogtle construction site for a while now. I'm interested in any reflections you have on how those interactions have been over the years, maybe more the people piece rather than the process piece we've been focusing on?

MS. COLEMAN: One of the advantages that I talked about early was interaction through the inspectors certainly on site and both the NRC at Region II and NRR.

I think we have had really good communications, having that presence on site is well-known, well-established, there's a very open communication chain, a very transparent communication chain.

It gives the NRC I think an early advanced look at things that are happening as they're happening issues. So, it has worked very well having inspectors on site, the relationships they have through Region II, and just the relationship that we have all around. So, it's worked very well.

COMMISSIONER BARAN: That's great to hear. We've talked a lot about flexibility and just the day-to-day changes one faces with a large construction project. How has that gone?

Because obviously our folks have to be doing specific inspections at certain times, it depends on when your folks are completing something or doing work. How has that coordination been? Have you seen a change over time on that?

MS. COLEMAN: No, I think that has been good and continues to be good. One of the best practices I think we've had is a lot of public meetings, a weekly standing public meeting, and so there's no lack of opportunities to

share information in both directions through normal inspections, through ITAAC inspections, and just through the normal day-to-day inspections the residents are in charge of.

COMMISSIONER BARAN: Great. Thanks. Scott, I was going to ask a little bit more about the plans for the Clinch River site. Can you talk a little bit more about how TVA has approached both your technology assessment that you referred to and just your overall technology selection process?

MR. HUNNEWELL: Sure, what we started in probably early '21 was assessing several of the different technologies that were out there and we had numerous categories that we assessed those in. And what we did was we gave each reactor design a score of 1 through 4, 1 being the most ready and 4 being the least ready.

And we went through and did it numerically and then color-coded it, green through red, and very quickly the BWRX-300 was the leader of the pack, meaning we thought it was the most deployable in the near term. Since that time, we have decided to prepare an annual technology report for internal use.

We expect the first one to be published by the end of March and that's where we continue to evaluate the different technologies and we do that through some non-disclosure agreements with the different vendors or publicly available information for us to go through and evaluate their readiness so that as we continue to look at what the future may hold we can continue to evaluate is a Gen 3 reactor the appropriate decision for a future deployment or is there a Gen 4 reactor that would best suit our needs?

COMMISSIONER BARAN: That's interesting. I had a great trip to Darlington in Ontario a few months back and we had a similar conversation. I asked Ontario Power Generation a similar question and they had a similar response.

And I know you all have a relationship with them. Can you talk a little bit about what role TVA is playing or will be playing going forward for the Darlington project?

MR. HUNNEWELL: Sure. We do have an agreement for collaboration with OPG and in that I traveled up there in mid-December to meet with them and several members of my team and they traveled down to Tennessee.

And the BWRX-300 that they're looking to deploy is a GEH BWR, boiling water reactor.

So, we operate three GE boiling water reactors at Browns Ferry so we've got experience in that area, so that's an area that we can help them because they're operating the CANDU reactors and just entirely different, especially when it comes to refueling.

That is when we sat in on the meetings and we started getting into the refueling discussions, it was absolutely foreign to them what you do in a BWR compared to what they currently do.

So, there's a lot of information that we're able to share with them to help enlighten them on what to anticipate, how to staff. And likewise, what we expect in return, what we are garnering from them, is insights into the construction.

Once they actually break ground, we'll probably be about two

years behind them so we'll be able to get lessons learned. They're sending one of their individuals to a BWR cert class at Browns Ferry.

We expect to embed at least one or two people up on their project to help monitor and share information back and forth.

COMMISSIONER BARAN: Great, and TVA of course has an early site permit for the Clinch River site. How are you all planning to leverage that with the construction permit application?

MR. HUNNEWELL: By reference. We expect to entirely reference it. The early site permit was technology-neutral for up to 800 megawatts electric so that bounds the technology.

There will be some things in the early site permit that weren't addressed because it was technology-neutral that will have to be pulled in but we do expect to capitalize on that early site permit.

COMMISSIONER BARAN: And Marc, you discussed and maybe really a predicate for this whole conversation is there's obviously a lot of interest right now in the new reactors in the U.S.

What's your current sense, I know you all at NEI have been doing surveys and other things, to the extent you can talk about it, of the timing and number of coming early site permit and limited work authorization applications?

MR. NICHOL: Yes. What we're seeing is that the number is increasing and they're all moving closer in time. So, I don't have specific numbers and how many applications you'll get in any given year.

However, we do have a map that we share that shows 20 projects between the U.S. and Canada that are either being considered or planned for

deployment by 2030.

And so that's at least 20 that are on the books out there publicly that would all be applications between now and let's just say 2026 in order to be timely by 2030. But as I said, we see that number increasing and moving closer in time.

COMMISSIONER BARAN: Are you seeing a lot of interest in early site permits in particular?

MR. NICHOL: We are, the updated survey that I mentioned to you, we asked for the first time a question, are people looking at using early site permits, and I think it was eight companies that said yes.

And so this really gets to time to market. An early site permit is a way to get the siting questions resolved and then move on towards the technology decisions and help accelerate future licensing processes.

COMMISSIONER BARAN: That's very helpful. We focused a lot today on the processes which are obviously critical but there's also really the Agency's capacity and capability, as Jamie in her discussion kind of alluded to in a way.

For example, if we're looking at a large number of early site permits in the next few years, we may need to beef up our environmental capability here because that already is at times kind of taxed and stretched with the work we're already doing.

So, as I've said to folks when I interact with them, the better information we can get, the better we can plan for that ramp-up and be ready. I want to avoid a situation where we're in some kind of triage mode.

I want to make sure the Agency can deal with the full demand as

it comes in for reviews of whatever type of application we're talking about. I'll stop there, thank you all, I appreciate it.

CHAIR HANSON: Thank you, Commissioner Baran. Thanks again to our panelists this morning for the really good presentations and the good discussion we've had. We will reconvene probably just a little after 10:30. Thank you all again.

(Whereupon, the above-entitled matter went off the record at 10:21 a.m. and resumed at 10:28 a.m.)

CHAIR HANSON: Okay, good morning, thank you, we've got the second panel of our meeting on Reactor Regulation under Parts 50 and 52. We've got, as I said, our Staff panel, and I'll hand it over to Dan Dorman, our Executive Director for Operations.

Dan?

MR. DORMAN: Thank you, Chair, good morning, Chair and Commissioners. Staff appreciates the opportunity to provide an overview this morning of NRC's strategy to license advanced reactors utilizing the established regulatory frameworks under Parts 50 and 52.

Today the NRC is ready to license new and advanced reactors and other new technologies under Parts 50 and 52 as a result of substantial progress we've made in our efforts to prepare for licensing new and advanced reactors over the last decade.

However, our efforts continue as we push forward to improve our regulations, guidance, and processes in preparation to license these reactors and in accordance with our principles of good regulation.

Next slide, please. In this presentation today we will be

providing you insights as to where we are now, what we are doing to continue to improve our regulations and processes and what we hope to achieve.

During this panel, Rob Taylor, the Deputy Office Director for New Reactors in the Office Nuclear Reactor Regulation, or NRR, will talk about our experience with and enhancements to the Part 50 and 52 frameworks in licensing new and advanced reactors.

After Rob, Bernie Thomson, the Deputy Director in NRR's Division of New and Renewed Licenses will be discussing licensing and process improvements reflecting lessons learned from recent new reactor application reviews.

Following Bernie, Omid Tabatabai, Senior Project Manager in the Division of New and Renewed Licenses will provide an overview of the Part 50 and 52 rulemaking.

And finally, Candace de Messieres, a Branch Chief in the Division of Advanced Reactors and Non-power Production and Utilization Facilities will discuss development and use of modern and risk-informed approaches to license advanced reactors and also successes and challenges in reviews of advanced reactors applications under Parts 50 and 52.

Next slide, please. This concludes my opening remarks, and I'll turn the presentation over to Rob.

MR. TAYLOR: Thank you, Dan, and good morning, Chair and Commissioners. Thank you for the opportunity to provide you with our experience with and enhancements to the Part 50 and 52 frameworks in licensing new and advanced reactors.

Next slide, please. The Staff is demonstrating through its

ongoing safety and environmental reviews that the NRC is ready to license new and advanced reactors and other new technologies using Parts 50 and 52.

In conducting these reviews, the Staff is focused on the NRC's mission to protect public health and safety and the environment. We realize that we can achieve that mission best through focusing our reviews on the most risk and safety-significant aspects of these new technologies.

This risk-informed safety focus is yielding benefits for the NRC, applicants, and the public through more timely and efficient reviews. I want to take a few minutes and talk about recent successes that demonstrate our ability to apply these approaches to current and future reviews.

In 2020, the NRC completed the first review of a small modular reactor when we issued the final safety evaluation report and environmental assessment for the NuScale design. The NRC Staff completed that review within an established schedule, resolving many highly challenging and novel issues for this first-of-a-kind design.

We undertook a thorough lessons learned effort, recognizing this novel review would provide significant insights in how the NRC and applicants can better execute on future reviews.

We will discuss how we're applying lessons learned from that review to current and future reviews during Bernie's presentation.

In addition to the completed NuScale review, the NRC recently issued the final environmental impact statement and anticipates issuing the final safety evaluation report this month for the SHINE medical isotope facility operating license.

We are also making substantial progress on the Kairos Hermes

test reactor construction permit and plan to issue the advanced safety evaluation report with no open items this month.

Both of those reviews have afforded us opportunities to apply the enhancements we have been developing to conduct risk-informed safety reviews and to better leverage data.

For each of those reviews, we have conducted our thorough safety and environmental reviews ahead of established schedules and budgets.

In fact, for the Kairos review through open and constructive engagement during pre-application and the licensing review, the NRC was able to establish an aggressive 21-month review schedule that we anticipate beating.

We also recently accepted the Abilene Christian University research reactor construction permit application and have established an 18-month review schedule.

Finally, in preparation for future submittals, 15 vendors are engaging us in pre-application activities such as the reviews of topical reports and white papers.

The NRC is leveraging data and performance tracking capabilities to assessing our ability to complete these reviews in a safe, timely, and efficient manner.

Over the last two years, the NRC has completed 63 pre-application review activities, executing these approximately 90 percent of the time on schedules and within budgets.

This early engagement and timely resolution of issues will facilitate more efficient reviews of future licenses and permits. Next slide,

please.

I spent the first slide talking about the outcomes that we're seeing. Now I would like to shift our focus and talk more about the efforts we're implementing that Dan previously mentioned and how it is yielding the results I just discussed.

We are building on our previous accomplishments and assessing any lessons learned. We recently issued the NuScale lessons learned report which provided an overview of how the Staff is taking lessons from our previous experience to enhance current and upcoming reviews.

The Staff is working with the ongoing Vogtle lessons learned initiative to capture any insights for future Part 52 licensing and construction.

Lastly, the Staff will continue to identify and institutionalize best practices as we gain more experience with the Kairos Hermes construction permit, the Abilene Christian University construction permit, and the NuScale U.S. 460 standard design approval applications.

The Staff is preparing proposed updates to our regulations targeted on ensuring the right safety focus for new and advanced reactors.

For example, Candace will touch on the advanced reactor nuclear reactor generic environmental impact statement and Omid will be discussing the rulemaking to align the licensing processes and lessons learned from new reactor licensing, often referred to as the Part 50-52 rulemaking.

Other rulemaking efforts focus on alternative physical security requirements for advanced reactors and emergency preparedness for small modular reactors and other new technologies that will provide risk-informed, performance-based approaches for demonstrating safety and security for new

designs.

We also work closely with potential applicants to assess the appropriate applicability of the Part 50 and 52 regulations to their novel designs. This is an essential early review area that provides clarity and reliability for licensees and the NRC.

We recognize that updating our guidance can also play a crucial role in ensuring clear and reliable safety reviews.

We have invested significantly in enhancements to our guidance that are intended to provide new and advanced technologies, clearer and more efficient approaches to satisfying NRC regulations.

Bernie and Candace will provide additional details as to how we're preparing guidance that demonstrate new risk-informed approaches to making our regulatory decisions and how we are ensuring the right level of effort in our licensing reviews.

In addition to enhancing our regulations and guidance, we have made substantial improvements to our regulatory processes including how we prepare and issue requests for additional information, conduct audits, and perform and document our safety and environmental reviews in re-envisioning our engagement with our partners such as the Advisory Committee on Reactor Safeguards, or ACRS.

Lastly, we've embraced data and analytics to provide ongoing assessment of our performance and to track project execution.

We've implemented better project tracking tools that allow us to monitor progress with more precision and accuracy in discrete review areas to assess whether they are progressing as envisioned and engage early when

challenges arise.

This is leading to better project execution and transparency as we prepare and present project status through tools such as public dashboards which are being piloted for current reviews. Bernie will provide additional details on our efforts to leverage data for performance monitoring accountability.

Next slide, please. This brings us to what we expect success to look like. Our efforts are grounded on our perceptions of good regulation in which the Staff is independent, open, efficient, clear, and reliable in their execution of the licensing of new and advanced reactors.

To accomplish this, we are ensuring we have a talented and qualified workforce with relevant education, skills, and experience. We will have regulations and guidance that provide clear expectations of what is needed to receive a license.

We will conduct risk-informed reviews focusing on the most safety-significant areas. We will be efficient and reliable in executing our safety and security mission through timely and cost-effective decisions.

Finally, we will continue to be open and appropriately consider the interest of stakeholders in meeting the Agency's important safety and security mission.

Next slide, please. Now I'm happy to turn the presentation over to Bernie Thomson.

MS. THOMSON: Thank you Rob. Good morning, Chair Hanson, and Commissioners. Thank you for the opportunity to provide an overview of improvements we've made to conduct efficient and reliable reviews

through enhancements to our regulatory processes of organizational changes, better data analysis, and execution. Next slide, please.

Rob mentioned that we undertook a lessons learned effort following the NuScale review and we are applying those lessons to ongoing and future reviews. As we prepare for the licensing of new and advanced reactors, we've leveraged the lessons learned from the NuScale review, successes and challenges from the Clinch River early site permit, the Korea Hydro and Nuclear Power APR 1400 design certification and ongoing activities for Vogtle's Unit 3 and 4.

We've made changes in our regulatory processes based on the lessons learned. We've reviewed how we prepared and issued requests for additional information or RAIs, conduct audits, prepare safety and environmental reports, and track and elevate issues quickly.

During the NuScale review, Staff identified how we could improve the overall process when preparing and issuing RAIs. RAIs remain a valuable and essential tool to ensure our regulatory decisions are open and transparent and that the necessary information is on the docket to support our safety and environmental findings.

Recognizing that we are not always clear and consistent in our preparation of RAIs, we launched a team to overhaul the process.

This team identified key attributes that every RAI should include, such as clear regulatory basis, an explanation of the safety significance, and what information is needed to make a safety finding using risk-informed methodologies.

RAIs not having these attributes contribute to additional time

between the NRC and licensees discussing the needed information and how to respond. The Staff implemented these revised processes in the middle of the NuScale review and immediately noticed improved communications and efficiency in engagements.

We've carried this forward in future reviews and are realizing the benefits there are as well. Staff expanded an enhanced use of audits which allowed us to engage directly with the Applicants and clearly and efficiently understand safety and environmental aspects of the application.

Specifically, we've enhanced our audit processes to more clearly in the audit plan regarding the scope of the audit and desired outcomes and the documentation of the audit findings. At the end of the audit, additional information needed for docketing can come through more focused RAIs.

The Staff also recognized the importance for streamlining safety evaluations and environmental reports to focus efforts on key details needed to support conclusions satisfying the Commission's regulations.

We've done this without compromising our safety and environmental mission. Finally, the Staff implemented enhanced processes to identify and elevate challenging issues early.

During the NuScale review, the Staff and Applicant worked constructively to address 29 highly challenging issues.

For future reviews, the NRC is focused on the early identification, communications, and the elevation of such issues. This brings the issue to management attention promptly and focuses our resources on timely resolution.

Next slide, please. In addition to enhancing our regulatory processes, we've made changes to how we organize and prepare ourselves to

conduct an efficient review. Two key changes that were made are the implementation of core and interdisciplinary review teams and streamlining phases of our reviews.

Historically, new reactor reviews used the matrix organization. Staff within divisions were assigned their portion of the review and provided their safety and environmental input.

This approach did not always provide reviewers with a holistic safety perspective and detracted from a fully informed review. To address this limitation, we implemented core and interdisciplinary review teams with dedicated subject-matter experts.

This allows for collaborative work across key technical disciplines to holistically address safety aspects of the design and allow the Staff to focus on the more risk and safety-significant aspects of the design.

Kairos is the first advanced reactor review where we fully implemented this concept and we have seen substantial benefits in the safety focus and efficiency in the review. We are implementing this for the Abilene Christian University and NuScale reviews and plan to carry it forward in other reviews.

Additionally, after the NuScale review we examined how we organized the phases of our review. Historically, we used the six-phase review model which we have now consolidated to a four-phase model.

In looking at the six-phase model we identified inefficiencies in the areas such as ACRS engagement and documenting safety evaluations. For safety evaluations, we consolidated phases to produce fewer interim documents which consumed resources and time.

By working with the ACRS, we identified ways we could enhance our focus on the most important safety aspects of the design and consolidate the two ACRS reviews into one phase. We implemented this in the latter stages of the NuScale review but the NuScale review more recently with the SHINE review with success.

We will soon present the Kairos review to the ACRS and we expect similar benefits. Next slide, please. We focused substantial efforts on our use of data to improve our planning and execution for new and advanced reactors.

During the NuScale review, the Staff used legacy project management tools which were cumbersome and inefficient for status tracking.

These systems were unable to provide ongoing assessment of project progress and resource expenditures to evaluate against deviations from expectations. Recognizing these limitations, Staff initiated an effort to enhance project management and execution tools.

For the SHINE and subsequent review, the Staff is using the enhanced capability of the reactor program system, a project management tool to plan, budget, and monitor execution.

The Staff now can more effectively allocate resources based on the most risk and safety-significant aspects of the design and then monitor performance in those areas.

The tools provide insight into whether we are performing the risk-informed reviews we designed. Additionally, we built dashboards and reports that allow for quick assessment of project execution and achievement of key milestones to ensure accountability of schedule and budget.

These tools will allow us to acknowledge and implement changes in review schedules and budgets in response to unanticipated situations such as an Applicant's design change during a review while maintaining a safety focus.

These tools contribute to our openness with the Applicants and the public. The Kairos review is the first application using a public-facing dashboard for the application and for the public to track and review progress.

We have developed and published a simpler dashboard for the Abilene Christian University review and are developing one for the NuScale standard design review application. Next slide, please.

Thank you and I will now turn it over to my colleague, Omid.

MR. TABATABAI: Thank you, Bernie. Good morning, Chair Hanson and Commissioners.

I'll be providing an overview of ongoing rulemaking efforts to align the regulatory requirements between 10 CFR Parts 50 and 52, particularly how this rulemaking would enhance the licensing reviews of new and advanced reactors.

Next slide, please. In September of 2015, the Commission approved the Staff's recommendation in SECY-15-0002 to initiate a rulemaking to align nuclear power plants licensing requirements under Parts 50 and 52.

In May of 2022, in response to the Commission's direction, the Staff submitted a proposed rulemaking package under SECY-22-0052 for the Commission's review and approval.

The rulemaking's objective is twofold, first, to align Parts 50 and 52 licensing requirements and second, to incorporate lessons learned from the

recent new reactor licensing reviews.

As Bernie stated in her presentation, incorporating lessons learned from past licensing reviews would reduce unnecessary burden on Applicants, licensees, and the Staff without adversely impacting Staff's ability to make a safety determination.

The proposed rule applies to any new or advanced reactor technology. As such, this rulemaking will enable the Staff to review license applications for any reactor design against a consistent set of technical standards regardless of the licensing process that the Applicant has chosen to submit to the NRC.

Some examples of proposed changes include eliminating the duration of the design certifications, eliminating standardization as a criterion for justifying the change request by licensees and Applicants, processing change requests while a plant is under construction, and referencing manufacturing licenses and standard design approvals while they are under the NRC review.

Next slide, please. Since the mid-1980s, the NRC Staff had focused its efforts on developing and updating requirements in Part 52 without consistently incorporating similar requirements in Part 50.

In the regulatory basis document for this rulemaking published in January of 2021, the Staff identified 11 regulatory areas for alignment. These alignment areas include consistent application of Commission policy statements to different licensing processes as well as select safety, security, and environmental-related regulations.

In identifying these alignment areas, the Staff took a holistic look at Parts 50 and 52 to identify opportunities for enhancement through the

regulations and engaged with the Staff across the Agency and sought input based on licensing experience.

In this rulemaking, the Staff has proposed over 120 changes to the requirements in 67 sections of Parts 50 and 52. The proposed changes require conforming changes to 9 other parts in Title 10 of the Code of Federal Regulations, 3 chapters of the Standard Review Plan and 11 Regulatory Guides.

The NRC has continued to demonstrate openness during the development of the proposed rule by conducting multiple public meetings with stakeholders. In developing the proposed rule, the Staff received 8 letters with a total of approximately 100 individual public comments.

For instance, one public comment requested the Staff to develop a generic change process for standard design approvals, or SDAs, such that SDA holders can make generic changes to the approved SDAs.

To address this comment, the Staff drafted a new change process for approved SDAs and additionally drafted a new process for the Applicants who wish to take departures from referenced SDA in their applications.

Next slide, please. As I mentioned before, the proposed changes in this rulemaking apply to any new or advanced reactor design.

To enhance the clarity of how the existing regulations apply to new and advanced reactors, the Staff recognized the value of a public comment requesting the Staff to clarify the applicability of the regulations to non-light water reactors.

In response, the Staff drafted applicability statements in several

regulations to clarify the requirements such that only applications whose designs meet the entry conditions for the reference regulations would be required to meet the regulations.

For example, a combined license Applicant must provide a description of the reactor vessel material surveillance program required by Appendix H to Part 50. The Staff's proposed change clarifies that the requirements associated with the reactor vessel surveillance program only apply to light water reactors.

The next presenter, Candace, will provide additional information regarding Staff's current activities to identify on a generic basis which regulations in Parts 50 and 52 are applicable to non-light water reactors.

In conclusion, I would like to reiterate that aligning the regulatory requirements between Parts 50 and 52 and incorporating lessons learned from the past reviews will better enable the Staff to conduct a clear, reliable, and efficient review of new reactor license applications regardless of technology or the licensing process that an Applicant chooses to pursue.

Next slide, please. Thank you, and I now turn the presentation over to Candace.

MS. DE MESSIERES: Thank you, Omid, and good morning, Chair and Commissioners. I am pleased to be here today to highlight NRC's progress using modern risk-informed approaches to review advanced reactor applications under Part 50 and 52.

Next slide, please. While foundational work to improve the licensing of advanced reactors has been underway for the last decade, goals detailed in NRC's 2016 vision and strategy for safely achieving effective and

efficient non-light water reactor mission readiness provided an actionable line of sight for regulatory readiness preparations.

I am pleased to say that the NRC Staff is on track in executing the vision and strategy through the completion of implementation action plans.

The Staff's significant progress in areas such as computer codes and review tools, flexible review processes, Staff knowledge, skills, and capabilities, policy and technical issues, consensus codes and standards, and communication are resulting in enhanced regulatory clarity and reliability for Applicants while advancing NEIMA objectives.

Next slide, please. Here I will highlight key regulatory guidance completed in part under the implementation action plans but is enabling near-term advanced reactor applications.

Regulatory Guide 1.233 endorses the licensing modernization project, or LMP. The LMP methodology is risk-informed, performance-based, and technology-inclusive and focuses on key areas of the design and licensing of advanced reactors.

While LMP was one approach considered during the development of Part 53 Framework A, it is being leveraged today to support pre-application activities of near-term Applicants such as TerraPower and X-energy.

Regulatory Guide 1.232 provides guidance regarding the development of principal design criteria or PDC. Like the light water based general criteria contained in Part 50 Appendix A, the PDC established the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components that are important to

safety.

Guidance regarding the content of application for non-light water Applicants using the LMP approach will be issued in draft form as nine interim Staff guidance documents and one draft Regulatory Guide for public comment as part of the advanced reactor content of application project, or ARCAP.

ARCAP encompasses the industry-led technology-inclusive content of application project and when issued, will be available for use by near-term Applicants.

The ARCAP guidance will help ensure complete submittals while avoiding unnecessary burden on the Applicant and right-sizing the application commensurate with the complexity of the design.

Additional recent guidance supporting advanced reactor applications include updates and supplements in NUREG-1537 addressing non-power reactor molten salt construction permits and interim Staff guidance for light water reactor construction permits.

The NRC recognizes the benefits of having a flexible regulatory framework, allowing potential Applicants to select a best-fit path towards regulatory reviews and decisions.

In this regard, I'll briefly expand on Omid's reference to the Staff's white paper on applicability of NRC regulations for non-light water reactors.

The NRC Staff is gaining notable experience applying this guidance in technology-specific contexts through white papers and topical report reviews from designs from vendors such as Kairos, TerraPower, Westinghouse, and X-energy.

The Commission was recently briefed on advanced reactor fuels. I won't go into detail, but I'll just mention here that the recently issued NUREG-2246 on fuel qualification is providing a risk-informed, technology-inclusive framework for assessing fuel performance and developing adequate evaluation and validation parameters.

Notably, NEIMA highlighted the need for guidance in this area. The NRC is also working to ensure consensus standards can be leveraged by advanced reactor developers through endorsements in areas such as non-light water reactor probabilistic risk assessment and high-temperature materials.

Next slide, please. I will now discuss a few notable accomplishments and reflections from ongoing non-light water licensing reviews starting with the Kairos Hermes construction permit review.

Reflections to date reveal that primary factors facilitating the aggressive review schedule were the high quality of the application and Applicant responsiveness to NRC Staff information needs. Substantial pre-application engagement contributed to the high quality.

For example, Kairos submitted 11 topical reports on key topics for a first-of-a-kind reactor in areas such as fuel qualification, materials qualification, mechanistic source term, reactor coolant, and principal design criteria.

Submission of topical reports during pre-application fostered early meaningful engagement with the ACRS. The Hermes project team arranged to send early drafts of safety evaluation chapters and coordinated design overview briefings to the ACRS.

Bernie and Rob mentioned the use of audits. For the Hermes

review, the extensive use of audits resulted in numerous timely application updates and an optimized use of RAIs.

Finally, I cannot emphasize enough the role of highly skilled experts in a dedicated core team review team structure to review success. You've heard we are innovating in both safety and environmental review areas. I'll add that the comprehensive draft environmental impact statement, or draft EIS, for this application was issued ahead of schedule without compromising thoroughness.

Like the safety review, this was enabled in part through successful pre-application preparations and focused audits.

Additionally, certain innovative approaches that were developed as part of the Staff's advanced nuclear reactor generic environmental impact statement, or ANRGEIS effort, such as streamlined EIS format were used.

Notably, the ANRGEIS features enhanced innovations such as use of technology-inclusive performance-based plant parameter envelope approach and generic evaluation of over 80 percent of environmental issues.

If implemented, the ANRGEIS will help further streamline the environmental review process. I will now briefly touch on very early insights from the recently accepted Abilene Christian University molten salt research reactor construction permit review.

Again, pre-application engagement ensured the early identification of technical issues needing resolution prior to application acceptance as well as key technical information that is used to risk-inform the review.

Pre-application audits served as a forum to discuss attributes of

a high-quality application that again are needed to establish aggressive review schedules. Next slide, please.

While we are effectively and efficiently reviewing non-light water advanced reactors today, we are also managing and overcoming challenges. Non-light water reactors come in a wide variety of designs, from molten salt to high-temperature gas-cooled, to liquid metal and microreactors.

This diversity can pose training and other resource challenges. To manage this, the NRC provides technical Staff with internal and external training and development, supports cross-training between core teams, and promotes cross-office collaboration.

As needed, contract support is also pursued. To address uncertainty in application submittal schedules and design changes, the NRC continues to encourage the development of regulatory engagement plans and pre-application engagements including early submission of topical reports and white papers.

Lastly, while NRC has the tools and experience to implement novel regulatory infrastructure for first-of-a-kind applications, any new approach inherently comes with unique technical challenges.

In this regard, we encourage Staff to be flexible and leverage their knowledge and experience implementing related guidance and approaches in new contexts.

Next slide, please. Thank you for your attention, and I'll now turn the presentation back over to Dan.

MR. DORMAN: Thank you, Candace.

As you've heard, the staff has made tremendous progress

towards improving our regulations, guidance, and processes and is ready to license new and advanced reactors and other new technologies under Parts 50 and 52.

I would like to thank all the panelists today, the Staff who supported the preparations for this Commission meeting, and the Staff who are working to prepare for the future of licensing new and advanced reactors using the current regulatory framework.

And the Staff implementing our lessons learned in the ongoing pre-application and licensing activities. Thank you, Chair Hanson and Commissioners, for the opportunity to present today and we now welcome your questions.

CHAIR HANSON: Thanks, Dan, and thanks to the rest of our panelists. We'll begin again with Commissioner Wright.

COMMISSIONER WRIGHT: Thank you, Chair, and good morning, good presentations, a lot of fruitful discussions so far and I hope it continues on this panel.

As I mentioned in my opening remarks and I know you agree on it, I do believe it's important that we're not a barrier to these new technologies if they do meet our reasonable assurance threshold.

So, with that, I'm going to go ahead and start. Rob, I've got a question for you. On your Slide 5 you talked about the need to focus on our licensing reviews for those portions of the design with the highest risk and safety significance.

I know that's been an Agency goal for a long time and it's one that obviously I support and I know the others do as well. It's how we should be

thinking about our reviews.

I've also been told that past efforts have shown that it's sometimes harder to do than it looks. And what I mean by that is while we have PRA and other tools to show us which aspects of a design might be of lower safety significance, it can be difficult to tell our reviewers not to spend time in those areas, especially if they start finding problems or maybe the application doesn't contain the level of detail that maybe they expect traditionally.

So, with that in mind, can you maybe provide an example of how this philosophy actually played out maybe in one of the recent reviews?

MR. TAYLOR: Sure, Commissioner, I agree, we haven't done the job we've desired to do on risk-informing our reviews.

So, actually, if I could focus on the lessons learned, what we're going to do here for the NuScale review, since the NuScale representative brought it up. We initiated that audit to do a review of their PRA right at the beginning of the review. So, we have great insights to the core damage frequency sequences for that facility and the large release frequency sequences related to that. We're taking that information, which would be information we would review in Chapter 19 of the application, and at the beginning of the review we're going to use it to define which areas of the review require more in-depth aspects and which require less.

And we're going to allocate resources in those areas based on that risk-informing. So, that's taking the risk-informed information and incorporating it into the review focus.

When we identify highly challenging issues early, which we didn't do well in the NuScale review, it was a little bit into the review before we started

to document the highly challenging issues, we going to identify those on the front end.

And then we're going to take the risk insights and ask how are we going to resolve those in the most efficient manner possible and address it?

And we may find some are very low risk significance so you can accept less detail in that area because there's no challenge to public health and safety based on the combination of the risk insights and the deterministic.

So, we're incorporating the risk aspect right into the review right at the front, defining the scope in-depth that we're going to go into and various areas of the review, and allocating the resources based on that.

So, we're going to hold true as issues are identified to asking what's the risk significance of that issue and then tailoring our resolution of it based on that risk insight.

COMMISSIONER WRIGHT: Am I understanding you to say that maybe you haven't -- because I guess what I was looking for you to do was to give me some example of where you identified something that was lower safety significance and you therefore decided to focus your resources elsewhere.

You're kind of saying it a little bit differently?

MR. TAYLOR: Yes. So, I'll give you one from the NuScale review. There was a late design change in the NuScale review related to a boron dilution situation.

So, the Staff in looking at that issue, recognizing that the modeling was a challenge for that complex assessment, that the tools weren't perfect for that, went and leveraged risk insights to ask ourselves what was the potential consequences of that situation and what was the likelihood of that

situation.

And that really shaped how much information did the Staff need to make its finding on that late issue. We were able to disposition that issue without an adverse effect on our schedule for completing the FSER.

COMMISSIONER WRIGHT: So, as a follow-up, and Bernie, you might want to chime in on this one as well, the industry has been calling for short review schedules and less resource-intensive stuff, as long as safety is in the box.

Have your lessons learned from previous completed reviews identified areas that could be leveraged by the Staff to accommodate their requests like that? And maybe if you have an example that would be nice too.

MS. THOMSON: So, the Staff continues to leverage lessons learned from past experiences, engaging in agile approaches we learned. We adjust, we adapt moving forward.

I discussed many of the internal changes that we were able to leverage from past reviews in the current NuScale and Hermes going forward.

The pre-application engagement to optimize an application review we can use to help get better clarity on applications coming in.

Ideally, having early pre-engagement or pre-application engagements clearly in communications clarify the issues or identifies which issues we need to focus on as we go forward.

So, Staff continues to use these opportunities to adapt as we learn more, as we progress in the reviews, and apply them in a timely manner so that it can impact the schedule, the budget, but ultimately we get quality product so when it comes in we are managing our resources accordingly.

COMMISSIONER WRIGHT: Let me probe there a second. In the first panel the lady from NuScale referred to the fact that sometimes early engagement can be a problem potentially. And recognizing that, because you're nodding your heads, how are we finding that sweet spot?

MR. TAYLOR: I'll take a shot at that. Pre-application being voluntary has a span of the level of effort that gets put into it. So, on one spectrum is making presentations to the Staff.

That's good, that's helpful, but it's almost always not in sufficient detail to make decisions on resolution of issues in pre-application. It informs the Staff.

I agree, starting pre-application seven years before you're going to submit to us is probably not the most efficient because there's almost guaranteed Staff turnover during that.

But if you get to white papers and topical reports, the Staff makes conclusions based on that, that can provide clarity and reliability and efficiency to the review at the end.

So, what we've seen in recent pre-application and for the next set of Applicants, as Candace kind of mentioned even with Kairos, is we're making decisions based on white papers and topical reports that become to the maximum extent possible settled issues when the application comes in.

We don't re-open the book other than to confirm that any limitations and conditions on the topical report were satisfied. So, they take pieces off the table.

COMMISSIONER WRIGHT: That’s a benefit of a core team?

MR. TAYLOR: And the core team is phenomenal.

COMMISSIONER WRIGHT: It's the turnover that we heard about, bringing somebody new in who may have to go back to the baseline and start all over again.

MR. TAYLOR: But if we've documented those conclusions they have that knowledge management for sure.

COMMISSIONER WRIGHT: Thank you. So, there's a lot of work going on to improve Part 50 and 52 and we know that most folks, if not all of them, are going to come in under 50 and 52. We've also heard from some external stakeholders, not all, but given all of that, maybe we may not need Part 53.

And in NEIMA, Congress challenged us to create a pathway for advanced technologies to get regulatory certainty and get to market and to make it technology-inclusive, performance-based, risk-informed.

Can you talk to me a little bit about Part 52 and how this rulemaking is different than Part 53 and whether or not we still need Part 53, or do we need both?

MR. TAYLOR: I'll go ahead and take that on. The 50-52 rulemaking is taking the existing regulations and trying to enhance those. Those are right, wrong, or indifferent prescriptive regulations.

You have requirements for fuel, you have requirements for piping, you have requirements for containment.

We're trying to make those as efficient as possible for the licensing process using all the lessons learned that we've got and trying to enhance the tech-inclusivity that they have.

So, the goal of that rulemaking is to take those lessons learned

and make the process more efficient for those who want to use Part 50 and 52. But we can't fundamentally change the construct of 50 and 52 without a substantial overhaul and that wasn't the direction we initiated on.

So, Part 53 being I think one of the most important pieces is that risk-informed, performance-based aspect of it. You're not going to find very prescriptive regulations at each one of those steps.

You're not going to find a prescriptive fuel regulation or a prescriptive containment regulation because we have to be open to a variety. So, we try to set higher performance standards and provide more flexibility.

I think Part 53 is valuable to do because I think it's a place where we want to get to as an Agency. But I think 50 and 52 should remain viable options for those who want to use it.

COMMISSIONER WRIGHT: Ok. Thank you so much.

CHAIR HANSON: Thank you, Commissioner Wright. Commissioner Caputo?

COMMISSIONER CAPUTO: Good morning, thank you all for being here and thank you all for the work that you've done to prepare today. I know it's quite an effort to be here and I do thank you for putting forward your expertise for us to learn from you.

Rob, I'm going to start with you, one of the things that we talked about on the previous panel was the challenge of defining credible event and having clarity with that definition.

And one of the lessons learned coming out of NuScale is a reference to a design basis source term event of 3 in 10 billion years.

So, can you give me a little more information on just how you are

looking at risk-informing the definition and creating clarity, certainty, and reliability around that given the range of designs we anticipate seeing in the future?

MR. TAYLOR: I'll acknowledge during the NuScale design certification application we knew what the PRA was. We didn't take and put the tools in place to bring it into the rest of the review to inform, in all cases, our decision-making.

Now with the core teams, with the emphasis on the PRA at the front end and integrating it into our review, we'll take and look at those scenarios like you just mentioned, the frequency consequence of those, and say, what do we really need in this case to make our safety finding?

So, if we find very unlikely, very low-consequence events that the PRA tells us aren't worth it and have no impact on public health and safety, then we can scale those reviews appropriately relative to that. So I hope that answers your question.

COMMISSIONER CAPUTO: A start, but it also raises another question which is the challenge of bringing the PRA that far forward, particularly in the context of a construction permit.

So, I'll ask a different question. One of the things that the proposed rulemaking would do is codify several Commission policy statements. I'd like to understand better what problem is being solved here because we definitely heard from TVA and Mr. Nichol about the challenges of trying to use PRA in a construction permit situation.

So, has the Staff had difficulties in applying these Commission policy statements that we aren't aware of?

MR. TAYLOR: We've done one construction permit in the last four years for SHINE.

What the PRA aspect is trying to get to, and maybe I'll clarify something I heard on the prior panel, we recognize that at the construction permit phase, the maturity of the design isn't there for a full-scope PRA.

We won't have that level of detail. So, the idea is to get insights from the PRA that can be developed commensurate with the maturity of the design at that point to make sure you identify issues early and you factor them into your review to provide more reliability and clarity in the decisions.

So, if you only have 30 percent of the design done at that point, the PRA should be commensurate with the level of the design that's being completed.

We're not going to hold Applicants at the construction permit stage to having a full and comprehensive PRA because we know that's not possible.

COMMISSIONER CAPUTO: So, how do you give clarity to that?

MR. TAYLOR: The PRA can lend insights into what the design basis accidents should be and what the beyond design basis accidents may be needing consideration as part of that, as well as well what safety structures and components might need to be safety-related.

COMMISSIONER CAPUTO: I understand the benefit, the question I have is how do you give certainty to how much risk information you're going to require in a construction permit? There's a balance between some risk information that's going to inform some aspects of the application and a full-blown PRA.

How does Staff know how much and where to draw that line if the design is 30 percent complete versus 50 percent complete? How are the Staff going to draw that line?

MR. TAYLOR: I understand. Candace will help me on this one I think. I think we have a guidance document under development that will help inform this activity. If I'm remembering correct, we're planning to issue it here in a few months.

MR. TABATABAI: I can start, Rob. Thank you for that question. Actually, the NRC Staff is being proactive and the Office of NRR they have put together a team who's looking at exactly the same questions.

They're working with our potential construction permit Applicants individually to better understand the design, what the level of information for PRA at construction permit stage.

So, absent of having guidance, generic guidance, we are right now working individually with the Applicants to come to a common understanding as to expectations.

And I think the goal for the light water reactor side of the house is by late summer or early fall this year, to have that guidance out. Candace?

MS. DE MESSIERES: Yeah, and maybe I'll add a little bit just from the non-light water perspective. Something that's really exciting about what I do every day is that I get to see this at the front lines.

I recently was in a meeting with TerraPower seeing some preliminary information about their PRA and it was actually astounding. It was even more comprehensive than I anticipated at that point and that's during pre-application activities.

And so I did want to just mention, and I took a couple notes during some of the other remarks, that we are actually exercising this issue right now as pre-applicants look to use the LMP process for non-light water reactors.

So, we are developing guidance in the light water space. I would say there are similar efforts in the non-light water space. In fact, having discussions just this week about trying to identify those main technical issues about expectations at a more tactical level.

But I would say, again, at a review level, the Staff looking at these today, it's quite amazing to see this playing out in real time and really demonstrating those early insights, even if they're not reflective of the final design they inform the design.

And they're really an active component of the LMP process. So, I just want to offer that a little bit too because we are living it today.

COMMISSIONER CAPUTO: Thank you. So, Rob, what other Commission policy statements are you looking to codify in the rulemaking and why?

MR. TAYLOR: The other one that comes to mind is a severe accident policy statement to assess and consider severe accidents early in the design of the reactors.

We think that's an important piece because in our historical approach to this, we've implemented severe accident regulations after the fact, after plants were designed, and that creates significant costs and regulatory uncertainty.

So, doing a look for the severe accidents early and assessing

them and what needs to really be there, because most of the time you don't need safety-related equipment for that but you can credit non-safety-related equipment, assessing that and making sure we have clarity on that early in the design to avoid imposing those later.

COMMISSIONER CAPUTO: I'm not clear that the safety benefit of that was actually included in the regulatory analysis.

MR. TAYLOR: I'd have to go back and look at the regulatory analysis.

COMMISSIONER CAPUTO: Ok. Thank you. Ms. Thomson, I'd like to ask you a question about RAIs.

RAIs have historically been a huge challenge for the Agency and there is certainly a correlation between the quality of the application and the number of RAIs that the Staff needs to send in order to make the decisions and the safety findings they need to make.

So, hopefully the legacy of thousands of RAIs being issued on design certification applications are hopefully behind us.

Now, you discussed improving how we are using RAIs, in particular identifying key attributes that every RAI should include, a clear regulatory basis and explanation of safety significance and what information is needed to make a safety finding.

This seems reminiscent of an office instruction from the early 2000s. Have you revised the office instruction or is this more an effort to bring that more fully into practice among the Staff?

MS. THOMSON: Thank you for that question. It is more of an effort to bring it into practice with the Staff.

As I discussed, having clearer communications early on, we're able to identify the key components that are needed for the application, identify where the risk areas are, or potentially will be, in that application.

And that helps focus the Staff to the safety significant portions that they need to engage a thorough in-depth request for additional information. And it's almost a triage of the issues, those are highly significant.

We can get a clearer scripted RAI to get the information that is needed to make a safety finding or to clarify the information the Staff needs. So, the early discussion and we have engaged on developing a better template for RAIs so there is more consistency in how you're asking for the information. So, that coupled with the focused approach gets to a better result.

MR. TAYLOR: I'll clarify one thing. In NRO, before we merged the offices, we did overhaul the office instruction and then we merged the offices. We brought the insights from that and did a consolidation of the NRR and NRO office instructions to incorporate those insights and expectations.

So, that makes it applicable to the operating reactors and the new reactors.

COMMISSIONER CAPUTO: Ok. Great, thank you.

MS. THOMSON: I would add that I am post-NRO.

CHAIR HANSON: Thank you, Commissioner Caputo. Commissioner Crowell?

COMMISSIONER CROWELL: Thank you, Mr. Chair and thank you all for your presentations today. Helpful as always and the work that you and your colleagues do is integral to the success that we all hope to share here.

But to do so you need clear direction from the Commission, from

leadership in the EDO's office that's clear, consistent, and then having the resources to do those jobs. So, if that's ever not happening, make sure that feedback comes up as well as down.

So, Rob, I'm going to start with you -- Mr. Taylor, I'm trying to be more formal in these things but it is awkward to call you Mr. Taylor.

MR. TAYLOR: Either is fine by me.

COMMISSIONER CROWELL: Obviously, there's extensive experience at the Agency under Part 50 and 52 and I think Part 52 alone, there's been somewhere in the realm of 25-plus permit reviews and approvals.

Tell me a little bit more about the biggest lessons we've learned from those 52 reviews, and specifically how we've translated or passed those lessons learned and knowledge on to new employees who may not have been here during those previous reviews?

MR. TAYLOR: Thank you for that question. There is a lot that we've learned over the years, I'll emphasize maybe a couple here. I want to talk about the core teams more or the interdisciplinary review teams.

We didn't always have a systematic approach to bringing the Staff together and looking at the design holistically. That matrix organization construct that we talked about, that led to Staff doing their work sometimes in silos.

So, they look at their work and rightfully they're focused on safety, but they may not have the perspectives from other groups if they don't know to go look for those perspectives.

So, I think changing our model for how to do it and putting a core team together that looks at each issue holistically, so as they look at reactor

system design, they're asking what the PRA says, they're asking what the materials do, because that shapes what's really necessary in the design for robustness and quality.

So, I think that one is incredibly important. Going back to the RAIs discussion we were just having with Commissioner Caputo, we issued a lot of RAIs in those applications before and that was our go-to tool.

I'll give you an anecdote here. In Kairos through the use of audits, we issued a single-digit number of RAIs to the Applicant.

So, we got through that entire review raising the questions for clarity and context in audits that we would have usually just defaulted to issuing RAIs, and said, okay, do I need anything on the docket related to this or can I reasonably infer from what's already there and have a better understanding of what the words mean?

That shapes how many we need, how many RAIs we need, which streamlines the review.

COMMISSIONER CROWELL: Can I assume that core team structure you described is what helps when new employees come to the Agency or employees from other parts of the Agency come into NRR or NRO or wherever that they aren't starting from scratch?

MR. TAYLOR: It does. Another thing I'll emphasize is we have an advanced reactor training qualification program that we put the Staff through as we bring them on, lots of in-person instruction and education as well as courses on specific advanced reactor technologies so that they understand what the safety basis of those different technologies are so that they're primed to hit the ground running when applications come in.

So, we invest a lot in our people to get them ready for the reviews.

COMMISSIONER CROWELL: I want to come back to the pre-application engagements for a second because something you said earlier actually concerns me now about this.

Recognizing that the scope of pre-application activities is broad and varies from Applicant to Applicant, I think what I heard you say is the value is minimal because of Staff turnover, which isn't a great answer.

Please tell me that's not actually the case, because I think the pre-application space is going to be pretty important going forward because we're going to have new players we're dealing with than the traditional ones that have experience here.

And so they may not have the ability to come to you with things that are ready for a white paper or a decision. They need some feedback, some brainstorming perhaps even. So, talk me through how that pre-application phase can still be helpful?

MR. TAYLOR: I'm sorry if I gave you that impression. We are striving for stability in the review teams and putting and keeping the people experienced in the pre-application engagement on the team and then transitioning them when we develop the charter for each review to the actual review.

So, that's an emphasis and a point. I think the challenge comes sometimes that if pre-application is spread over a significant amount of time, there's a lot of dead time for Staff so we have to keep the Staff engaged and working.

So, they might be working on multiple projects at the same time. I can't lock one Staff Member down just doing pre-app for one Applicant sometimes because it might be months between submittals and things like that.

So, we have to balance that to use our resources efficiently while providing stability in the core teams wherever possible. So, we are emphasizing and actively looking at that because we want the people who made the decisions engaged in the meetings to carry those issues through.

They're going to be the most knowledgeable and the most efficient because they'll have a construct to the safety case for that design.

COMMISSIONER CROWELL: So, I assume there is some method for memorializing those pre-engagement activities so that when Staff move on or you reassign Staff as needed, a new person can come in and know what was the substance of those pre-application discussions?

MR. TAYLOR: Yes, we keep records on all the pre-applications. We get a licensing project plan or regulatory engagement plan from the Applicants and that often defines what they want to accomplish in pre-application.

So, as we go through each of those activities, we collect the information and maintain it for new Staff who may need to come onto the project.

COMMISSIONER CROWELL: You mentioned working on multiple things at the same time and I want to pick up on that theme but with you, Ms. Thomson.

How do you, from your management perspective, balance Staff resource allocation when you have multiple simultaneous applications that need

review? I'd say for instance like reactor systems or seismic engineering experts, those are important parts of the review and in short supply sometimes in terms of the expertise.

So, how do you balance that? Are you positioned to be able to manage multiple simultaneous reviews on those types of topics?

MS. THOMSON: We've been preparing for quite some time for managing applications of this type coming in.

We understand each application is going to be unique, so some of the efforts we've undertaken to, as Rob said, balance what we are doing. We routinely monitor changes that are going on in the industry so that we can help streamline and get better estimates of how long things will take to do.

Because many of these are a new type of applications coming in. We also look at, as we've discussed, pre-application engagements to get a good idea of what areas are clear, what areas need additional clarity.

We've discussed training our workforce, initiatives ongoing at divisional levels to capture information, knowledge transfer, and get that new Staff up to speed so that they can manage when the application comes in or work shifts.

We look at collaboration amongst ourselves so that we are better informed, and we can focus more on safety-significant issues. So, when you look at a project, a project is composed of the schedule, you've got the cost, and you've got the quality of it.

We engage in communications; we can directly impact quality because that application that comes in is going to be a higher standard.

By use of training our Staff we can impact schedules because

we have better estimates of what work needs to be done, how long it's going to take to get done, and that impacts our budgeting and out year's budgeting approach.

COMMISSIONER CROWELL: Within that context, is there an area of technical expertise that gives you the most concern about not having capacity on when you're faced with simultaneous reviews?

MR. TAYLOR: I'll take that, I've done this a few times. Nuclear engineers. It's a highly, highly competitive job market and we're competing with the very vendors and utilities who are preparing those applications and stuff and they're hiring up the nuclear engineers.

And so convincing folks to come to the NRC and being competitive with the industry is something we're working on heavily, but we do need to continue staffing up in the nuclear engineering realm because they're going to do the fuels portion of the review, they're going to do the reactor systems portion of the review that are so critical to the overall safety profile.

Those are the areas we're going to spend probably more resources on and less in other areas.

COMMISSIONER CROWELL: And I think a sense of purpose is something the NRC can offer those folks that is different from our stakeholders, so lean on that.

CHAIR HANSON: Thank you, Commissioner Crowell, and thanks to my colleagues, you guys have already plowed a lot of ground, so poor Commissioner Baran. I want to pick up, again, I'm trying to highlight some themes and I want to have a conversation I think, Rob, with you and Bernie about Staff development.

A number of folks have already touched on knowledge management. As we bring in new Staff, Rob, you were just talking about nuclear engineers, into the Agency, I want to highlight and recognize and celebrate the substantial work that's been done.

Certainly processes are important but my sense is overall culture change in this area around new reactors and the approach to doing these things. Rob, I'll start with you about as new Staff come onboard, that knowledge transfer is happening.

How is training and qualification of new Staff happening so that they can slip into those reviews and be effective reasonably soon?

MR. TAYLOR: We're investing in that knowledge management and training significantly. So, as new Staff come in to do the reviews there are established qualification programs for technical reviewers, qualification programs for project managers, and they are guided by senior staff and Branch Chiefs who have extensive experience to make sure they understand how the processes work, but also the kind of thinking that we want to have on these reviews.

So, we have that opportunity to do it early. The merger of NRR and NRO is bringing some Staff who have worked their lives in NRR into New Reactor Reviews for the first time.

So, we're giving them background training on the technologies and the needs relative to doing those kinds of reviews as well.

So, we're investing in it with the goal to make sure the Staff is ready to hit the ground running. What we try to do is make sure we have a plan for the Staff that are going to do each review about six months before it comes

in.

That's when we can say, okay, we know the application is coming, we can start to assign Staff to it, build our core teams out and then make sure those people all have the necessary training, because they might need molten salt reactor training, they might need high-temperature gas-cooled reactor training.

And then we make sure they've got that.

CHAIR HANSON: Thank you. I think Commissioner Caputo has talked about the importance of understanding the effectiveness of our training qualification and knowledge management efforts. I think I would certainly agree with her about that.

Bernie, one of the things you talked about is early identification and elevation. Can you maybe say a little bit more about that and about how that's working and where in the process, what does ‘early’ in the early identification mean, and what is the elevation piece in that? Can you talk a little bit more about that and how it's working internal to the Staff?

MS. THOMSON: Currently on the NuScale review that we've been reviewing, we've employed the opportunity to take the collective knowledge of the Staff and as we're collaborating we will be employing a technical advisor in that review when it comes in.

And part of the rationale and the requirements for that position is to work across the Staff and as issues are identified, if the Staff amongst collaboration within themselves are not able to resolve it, it elevates up.

And that individual, based on their background, their depth of knowledge, their experience, is able to direct the technical group to a resolution.

If they themselves cannot get that resolution, it can continue elevating.

So, it's a real-time application of solving the issue as it's identified and working with the Applicant to get the necessary information to resolve it. Again, I mentioned before agile project management, I've got a lot of background in project management.

You are using a communications tool to identify the issue and then part of your roles and responsibilities, you know who the solution-maker is. It may not necessarily be a collective at the Staff level, but the Staff informs the decision and that historically is a project management best practice and it works.

And that is a method that we are using going forward with the NuScale review because we realized there may be some challenges.

MR. TAYLOR: Just real quick, we're in acceptance review on the NuScale and we've identified two potential highly challenging issues. So, the emphasis we're trying to right now with the Staff is to say it's not a bad thing to elevate issues.

We want awareness at all levels because management provides some help to make sure we're taking the right risk-informed approach, that we have the right construct for making the decision in accordance with the regulations.

What we want to avoid is the churn of the Staff trying to resolve this and not making progress because at that level it just isn't getting resolved. So, we elevate it to push for resolution quickly because we recognize if you let these things linger, they'll consume resources throughout the review and detract from other areas of the review.

CHAIR HANSON: That's a great segue, Rob. And Bernie, I'm going to get back to your PMP certification in just a minute because I noticed it in the slides.

But before I do, in your presentation, Bernie, two words really jumped out at me when we're talking about the project management and trying to inculcate a project management culture in our reviews.

One was visibility and the data and the dashboards and those kinds of things and I think that's absolutely critical. And then you mentioned accountability but I almost wonder if the missing element in there was authority.

If project managers absolutely need to have visibility and they need to be held accountable but they also need the authority in a way to enforce -- I don't know what the right word is -- discipline and focus in those reviews.

So, do our project managers have that as they're going through this process?

MS. THOMSON: From an outside perspective, I've been here about a year now, looking at project management processes within the Agency, it's got the foundational pieces there. A lot of emphasis does have to be put on the accountability piece.

Because like I said, a project is essentially three parts and two of those parts affect cost. It's just standard practice.

But I think some of the things that we have been doing across the Agency, the use of the dashboards, does highlight clarity and a clear, visible picture of the program and what's going on with it. And that forces accountability.

The training aspect, we're training up project managers, there is a project management qualification that they go through.

We are using technology, the dashboards, to leverage at the management level, quickly identify trends and how we need to impact or weigh into -- if it's a positive trend, that's good, if it's a negative trend we can weigh in to affect it and change it to a positive impact.

I would say this, though, I'll take a chance here to say this, that Lean Six Sigma is an opportunity I think for the organization to holistically look at the processes that it has and streamline to best practices and that we can use to inculcate the culture of the new people coming in.

Because we've got to train them anyway and they will be the future of the Agency and they will be closing out some of these projects and programs. So, it's a short circuit method to get the culture engaged in best principles for project management, et cetera.

And, yes, I guess I am speaking from a PMP perspective.

CHAIR HANSON: I know I'm running out of time but I do want to sneak in one question about that because I'm a PMP drop-out, I took the course but never took the exam and as a former management consultant, Lean Six Sigma, you're kind of singing my song here on some of this stuff.

But I did want to ask you how you, as a PMP, project management professional, the value of that for you in your own work and whether that course and that certification is something we should make more widely available to the NRC Staff, either through encouragement, kind of soft, or more formally integrate some of the principles in the project management book of knowledge into our training and qualification courses?

MS. THOMSON: So, since I've been here I've been informally in transition with some of those best practices. The overall PMP certification, I'm all in favor of doing it. The key thing that it does is it sets a baseline level of knowledge for all project managers.

And when you have that common language, it makes it much easier to resolve issues to transition from various projects easily because you know when you go to something different there's a certain standard that it has ascribed to and you can easily move the knowledge, you can easily transition people across projects.

It does require an extensive amount of experience. The test is extremely difficult, but I think the value that you gain from it far outweighs the challenges.

When I was at Corps of Engineers before I came here, the process there was you went through a screen to identify and focus a certain group to take that test.

Now, if others wanted to do it, that was encouraged but the Agency actually paid for a certain percentage of people to get training. There was like a boot camp or something. I did it the hard way, there was bootcamp and then take the test.

And if you passed the test, the Agency paid for it, if you didn't pass the test, you paid for it. So, there was some incentive there to pass the test but what it did was a group would be learned in the best practices and that helped enrich the culture of the organization to take it forward.

And the Corps does a lot of projects, billion-dollar, multi-million-dollar projects very similar to what this Agency is doing with these applications.

From my perspective, it is an investment in the future of the people and the Agency that is well worth it.

CHAIR HANSON: Thank you very much, culture change, and thank you, Commissioner Baran, for your patience.

COMMISSIONER BARAN: Sure. Thanks, everyone. I think it's been a great discussion. I'll focus my questions on a rulemaking we've talked a fair bit about which is this Part 50-52 rulemaking, to get those parts better prepared for new reactors.

I think maybe the piece of it we've talked the most about is PRA. There are dozens of other pieces of this rule and maybe we could cover at least a few of those but let me start with PRA again just to ask on that.

There was a fair bit of discussion about the challenge of gauging design maturity and then therefore appropriate PRA maturity at the construction permit stage.

Can someone, backing up a little bit, does the Staff see a safety benefit with carrying the Part 52 PRA requirement over into Part 50? And can someone talk about just the overall safety benefit they're seeing for that provision?

MR. TABATABAI: Thank you, Commissioner, I can start and others can chime in. Let me just start by saying the purpose of this proposed rule with respect to PRA is to make Part 50 Applicants and Part 52 Applicants treated equally.

Right now, as you know, Part 52 Applicants are required to have a PRA, Part 50 Applicants are not required. And the Commission policy applies

to all regulatory matters so that is basically the reason for proposing that change.

In terms of benefits of PRA, of course, we are talking about risk-informing our reviews with respect to any application and construction permit is basically a licensing process.

We understand that of course the design maturity is not developed that much, like a combined license application for instance, not to that level, but an Applicant who comes to the NRC and applies for a construction permit, they know what kind of reactor they want to build.

That's the minimum information that's available and that's a good starting point basically. Designs are different and PRA levels could be different obviously.

And I think that's the reason why the Staff is working with potential Applicants, to better understand, basically, what the design is and how much information the Applicants could provide by the time they submit their application.

And based on my conversation with my colleagues in the Division of Risk Assessment, they don't see any pushback from the Applicants. They are willing to work, they are willing to cooperate with the Staff to come up with a common understanding as to what the expectations are.

And I think I would answer that from that perspective. And of course, if you have a PRA at the construction permit stage, by the time you transition to operating license space obviously you would only focus on reviewing the changes from the construction permit to operating license.

MR. DORMAN: I just wanted to make an observation. Over the

last couple hours I kind of heard what I thought was a paradox, that we wanted to do more risk-informed construction oversight but were not clear on what level of risk the staff is looking for at the construction permit stage.

So, I think clarity in what the Staff expects at the construction permit stage is important because I think what the Staff is looking for is risk insights commensurate with the maturity of the design that will help us, A, focus on the most important parts of the application for the construction permit, and then also we can bring that forward and make sure in our oversight we're at the most important items. So, the overarching trend of what we're trying to do over the last five years or so is really this focus on risk insights at the front end of the process, whether it's the licensing or the inspection process and how does that inform our focus on our level of effort as we go forward in the process to be most effective and efficient.

So, that's where I think the Staff sees an opportunity for benefit from having risk insights such as are available commensurate with the maturity of the design at that stage of the process.

COMMISSIONER BARAN: Great. One issue down, and we've got 60 to go. (Laughter) I'll lower my ambitions.

The requirements established after the 1979 Three Mile Island accident were applied to Part 50 construction permit and operating license application pending at that time, as well as future Part 52 design certification and combined license applications.

But they were never applied to future Part 50 applications I think because future Part 50 applications weren't anticipated. The Agency thought everyone would use Part 52.

The draft proposed rule would address that gap by applying the Three Mile Island requirements to new Part 50 applications. Does anyone want to say anything about the rationale for that provision or the safety requirements or the lack thereof of it?

MR. TABATABAI: Thank you. I can start and others can chime in. Post-TMI requirements are applicable to all designs and new reactors and all of them. And along with a proposal to have a construction permit Applicants or Part 50 Applicants to have a PRA available, having done that, many of the TMI action items will become redundant.

And as part of this proposal, we are also proposing to remove some of those TMI action items that would become redundant if a CP Applicant would develop a PRA. So, it's a matter of aligning the requirements, getting rid of duplicates.

We have duplicate requirements in, let's say, Part 55, for instance of that TMI action items. So, in this rulemaking we are trying to see if we are adding requirements where we can remove the duplicates and things we would not need in proposing this new requirement.

MR. TAYLOR: Can I add one thing? We talked so much about lessons learned. The TMI event posed probably the most significant opportunity for lessons learned for the Agency in our entire history.

So, the idea of taking those lessons learned and making sure we factor them into reviews just seems to make sense, appropriately factor them in based on the applicability to the technology.

So, I really think that's driving a lot of our perspective on this and there's no reason they shouldn't be applicable to certain designs.

COMMISSIONER BARAN: Let me ask about a couple potential changes that raised some concerns in my mind. Currently, design certification standard design approvals and manufacturing licenses have a 15-year term. After 15 years they would need to be renewed if they are continue to be used.

The draft proposed rule would eliminate the terms for a design certification and standard design approvals and extend the term for a manufacturing license to 40 years. What gives me pause is that we've seen several issues arise with the AP-1000 design certification, these were problems that needed to be fixed.

So, they were repeatedly addressed in combined licenses and they were fixed in the design certification renewal. But if the design certification is of unlimited duration, those fixes probably wouldn't have been incorporated into the certified design and we'd have a design codified in the regulations with known issues indefinitely potentially.

Does the Staff see that as a disadvantage? And maybe I'll just ask a related question and you can talk about the issue in its totality. I can definitely see an argument that the 15 years is too short, but there are other options besides unlimited duration.

My understanding, though, is that Staff didn't really analyze 20-year, or 30-year, or 40-year terms. I could see a 40-year term striking a balance between the current 15-year term and the Staff's concept of an unlimited term, and that would also match the Staff proposal of 40 years for a manufacturing license term.

So, I'm interested in your thoughts about whether a 40-year term has any merits?

MR. TABATABAI: Yes, actually I would say that the Staff did and did not consider different duration for design certification. We did not look at 20 or 30 or 40 years but the question that we asked ourselves was it worth extending or just eliminating?

And we looked at our experience from AP-600 renewal, ABWR renewal, and we realized that it really doesn't matter how long the duration is if nobody is going to reference the design certification.

So, there is no actual experienced licensing facility that references the design. So, from that perspective, it makes sense that we keep it open as when somebody comes in to reference those designs, then you can look at if there are changes, if there are errors in them, if there are updates that have to be done.

Otherwise, AP-600 and ABWR was just extra burden on the Applicants and the Staff and there is still no other Applicants referencing those.

MR. TAYLOR: Commissioner, just to add on Omid's response which was really good, if the Commission wants to put a longer term on it, the Staff would be supportive of that of course.

The key is there's a number of certified designs in the appendices that I'm not sure will ever be built.

We know nobody wants to build an ABWR in the United States or any ESBWR at this point in the United States. So, we can go through certifications or renewals on any periodicity and address those issues but if there's no plan to build it, have you enhanced safety for the public at that point?

So, I think it's a good question, we can do it on a frequency defined by the Commission but we also have to question the effective use of

our resources and those licensees' resources as well.

COMMISSIONER BARAN: I guess the challenge there is striking the balance on readiness because we don't really know who might come through the door at any time on a certified design and if we haven't done any of the work to make sure the design is where it needs to be, then it does create additional work on the COLs or whatever the vehicle is that comes in.

Well, we're dealing with about 60 issues, or 59, but I'll leave it there so we can wrap up. I'll just say that I think this rule, the draft proposed rule, includes some very important safety enhancements.

It also includes a lot of lessons learned as we've talked about today that we didn't get to talk about on operator licensing, simulators, fitness for duty, change processes.

It's almost like a walk through memory lane of the issues that were encountered and resolved on the AP-1000 sites or with the NuScale design.

And I think a lot of those things make a lot of sense and are the kinds of updates that are going to improve the use of Parts 50 and 52 for future Applicants, these near-term Applicants that we have now or will have soon. Thanks.

CHAIR HANSON: Thank you, Commissioner Baran, and thanks to all of our panelists, both external and internal this morning. I think we covered a wide breadth of issues as we often do and we also I think in this case ranged from the very high level also to the very detailed. And I found it very illuminating.

As we move forward, whether with Part 53 or harmonizing

appropriately Part 50 or 52, I hope the Staff stays in close communication with the Commission about -- in addition to the review and policy decisions that you might need from us about any one of those specific proposals - but also about some of the policy statements that are out there that are being incorporated in these, and if there are other kinds of revisitations or whatever that may be needed to enable these kinds of forward-looking regulatory infrastructure that we're trying to build here that I hope you all will be willing to engage us, identify and elevate early and often.

With that, we're adjourned, thank you all.

(Whereupon, the above-entitled matter went off the record at 12:02 p.m.)