

Good morning.

MIKE LAYTON: Most of you know who I am, but for the newcomers, I'm Mike Layton. I'm the Director for the Division of Spent Fuel Management here at NRC. So, yesterday, we had quite a full agenda. An awful lot of good discussion in the afternoon. Like Dan mentioned, it was a little bit of a slow start in the morning. I attribute that to the three-hour time lag to the west coast.

And today, we have a bit of a different schedule that we are going to go over. We'll be talking more on the inspection and oversight, and then also, in keeping with the theme of building on experience to improve spent fuel management, we are going to be a little bit forward looking, seeing what is before us and kind of what's over the horizon. And I think that's a very important aspect that we all need to keep in mind, because as Mark Dapas said in his keynote speech, these are interesting times. There's a lot of things in play right now. The uncertainties of funding with Yucca Mountain, new decommission is coming forward, new business models.

For NRC, it's the 2 CISF applications, a lot more work coming in. So the session that we talk about in looking over the horizon, I would like to have a lot more engagement than we typically have on our technical type of panels, because this is where we at the NRC, and I think pretty much everybody in the room and many of the folks that call in that have interest, would be interested to understand some of the insights and thoughts that everyone has on where we think we are going with spent fuel management here in the US. One of the other things that we are going to do a little bit differently this year is we included a panel entitled Public Insights, and I'll explain this a little bit more when the panel comes in, but this -- this is something that I ask for whenever we develop the planning for the REG CON this year. We haven't done it in the past three or four years, I think, and because there is so much public interest, because the future kind of looks like we are going to be having a lot more engagement in transportation, which brings all of the spent fuel management out into the public view, I want to be able to open up our REG CON to hear things from the public, or folks in the audience here, on what are the really tough rubs that we think are going to present to us in the near future. So that's kind of a little bit of a teaser for the last session.

Now, recognizing many of you have transportation to catch at the end of the day, we are going to wrap up a little bit earlier than yesterday, and I'm going to rely on Dan to keep us on schedule, particularly through the afternoon, so that nobody misses anything here, because they have to run it, dash, and catch a flight or a train. I also want to remind you that on the table outside, we have feedback forms for the REG CON. And I point back to Tony Rigato, because he has the tagline for these, is "either you love it or you hate it" forms. But beyond that, what I would hope is that you provide us insights in what we should be doing differently or what we should be doing better as we organize the next REG CON coming forward, and that's very important to us, because we do take into account what everybody has preferences for in developing this fall meeting for spent fuel management, and if you don't necessarily want to fill out the form, take one with you, because at the bottom you have Haile Lindsay's email address. You can send emails directly to Haile. He will incorporate all of this, and then at some point, probably in the January time frame, Haile brings all of this forward, and he has a meeting with

most of the staff, saying, "Here's what we have with the feedback from the REG CON." So with that, I hope everyone had a good evening, well rested, ready to engage, have enough caffeine flowing here to start the morning off. And with that, I will turn the meeting over, I guess, to our first panel, which is inspection oversight and Mr. Jeremy Tapp. Thank you all. [Applause]

JEREMY TAPP: All right. I'm going to wait for the guys and the gals to sit down. Okay. And thanks, Mike, for that opening remarks. As Mike said, my name is Jeremy Tapp. I'm an Inspector in the Division of Spent Fuel Management in the Inspections and Operations Branch. Today, I think we have an informative session for you. We have a number of different perspectives sitting next to me, both from the NRC and from the industry. We have a regional office representation as well as headquarters, so I think there will be a lot of good information that you can take back with you to your respective facilities, and hopefully you'll learn something from this as well, and, as always, please feel free to ask questions at the end of the session. So, really, the goal here is to provide you with recent operating experience in a number of areas, from headquarters inspections to regional inspections and from the industry and aging management. So, without further ado, I will go ahead and get started with our first speaker, Nicole Fields. She is an ISFSI inspector in the Region III Office out of Chicago, Illinois. She performs safety inspections with spent fuel loading and storage operations at Region III ISFSI sites.

And Nicole has been with the Agency as an ISFSI inspector since 2014, when she started in the NRC Nuclear Safety Professional Development Program. Prior to joining the Agency, Nicole performed cutting-edge research in the development of radiation detectors at the University of Chicago. There, she earned both an MS and a Ph.D. in Physics. Nicole also holds a Bachelor's in Astronomy Physics from the University of Virginia. Welcome, Nicole.

NICOLE FIELDS: Thanks, Jeremy. Can you guys hear me? Okay. So, good morning. As Jeremy said, my name is Nicole Fields, and I'm an NRC spent fuel storage inspector at the Region 3 office in Lisle, Illinois. Today, I'm going to talk briefly about some recent thematic inspection operations, in an effort to be transparent about what the ISFSI inspection safety.

Next slide, please. Thanks. I intend to briefly discuss three topics this morning. They are the industry sharing of ISFSI operating experience and how that information has influenced licensee actions, the difficulty in understanding the cask licensing basis, and some issues that are a result of those difficulties, and some areas in which we have seen that the ISFSI program is dependent on some aspect of the reactor program, which may be especially relevant for sites that intend to start the reactor decommissioning process soon while still maintaining an ISFSI.

Next slide please. The first operating experience example that I want to discuss is vertical cask transporter, or VCT, wheel hub failure. This has been a known issue in the industry since 2011. Recently, there was an instance of VCT wheel hub failure during transport of a loaded cask. The pictures on the right – you guys can see those – show that wheel hub failure. The pictures are courtesy of the licensee. Since that incident, several other licensees have taken preventative corrective actions to inspect VCT wheel hubs before use to reduce the likelihood that a similar

failure would occur during transport. Although the VCT is not typically an important safety component, this is a positive example of the industry using operational experience and taking preventive actions to reduce the likelihood of an operational occurrence. However, I do want to note that there were several.

The second operating experience example that I want to discuss is design issues related to licensees upgrading their overhead cranes to single-failure proof. Many licensees upgraded buildings. The NRC inspected these crane upgrades as part of the engineering preoperational ISFSI inspections. Similar design issues with the crane support structures, the crane rails, and the crane rail clips were found at multiple licensees, and the NRC issued multiple violations. This was a missed opportunity by licensees to identify or even prevent these design issues before they were identified through an inspection. Next slide, please.

It is significantly better from a safety perspective if issues are corrected or prevented by licensees before they become a potential problem. To quote Benjamin Franklin, "An ounce of prevention is worth a pound of cure." Sharing operating experience and appropriately incorporating that operating experience can help licensees avoid future problems. I can certainly say that inspectors do not want to have to write violations in order to share operating experience. Which particular operating experiences may be applicable to other licensees is not always obvious at first, so I would encourage licensees to think broadly about sharing their experience, which could improve safety at other sites. In some cases, inspectors have also observed operating experience being very narrowly applied by licensees -- for example, by specific cask model or by specific vendor -- without thinking more broadly about how that operating experience could generally affect them.

Now I'm going to move on to my second topic, understanding the cask licensing basis. As licensees and Certificate of Compliance, or CoC, holders are allowed to make changes to their ISFSI or cask design in accordance with 10 CFR 72.48, it is critically important to understand what the licensing basis for the cask is. This can be especially difficult for general licensees, as the CoC holder writes the final analysis. The current licensing basis for general licensee, typically, the amendment to which a particular Cask is already loaded, including any changes made under 72.48, is not necessarily the same as the current licensing basis for a CoC holder, who may be using their latest CoC amendment as approved by the NRC. The landscape of licensing can be quite challenging to understand. However, without a thorough understanding of the cask licensing basis, changes may be incorrectly made without an appropriate regulatory justification or without a required NRC review and approval. Now I want to emphasize some key points about the licensing basis.

First, each CoC amendment currently approved by the NRC is a stand-alone licensing basis. This means general licensees may choose any approved, and then that's where changes will be made. Cherry-picking is not allowed. Upgrading an already loaded Cask from the initial loading amendment to a later CoC amendment must be done in accordance with 10 CFR 72.214 by first performing appropriate evaluations. Secondly, the FSAR revision is also part of the original licensing basis for that CoC amendment. Although CoC holders are required to

periodically submit updates to the FSAR to the cask licensing basis to understand when performing 72.48 screenings or evaluations is that of design basis and safety analyses. Typically, the FSAR will have specific chapters will describe the cask design basis and the cask safety analyses. However, what information is part of design basis and what calculation is a safety analysis is not always clearly delineated in the FSAR. This can make it difficult to determine a piece of information. If information is important enough to be described in the cask FSAR, it's likely there for a reason. Understanding its function or functions in the overall cask licensing basis is key before making changes under 72.48.

The NRC standard review plans and the safety evaluation reports can also be useful resources in understanding a specific piece of information or a calculation as it is described in the cask licensing basis. Briefly, here are two reason inspection issues that are related to understanding the Cask licensing basis. The first is when a licensee made changes to the time to boil calculation as described in the FSAR. The licensee only performed a screening and did not perform an evaluation. The NRC opened an unresolved item (URI) on these changes and the URI was resolved with the issuance of a violation. The NRC's conclusion was that the time to boil calculation, as described in the FSAR, is a method of evaluation used in a safety analysis, and changes to that calculation are governed by 10 CFR 72.48. The evaluation that was issued was for the failure to perform an evaluation, and they also concluded that one of the changes made required NRC approval prior to the implementation of that proposed change.

The second inspection issue is that two licensees were using the latest revision for their cask systems, while the casks were still under the CoC amendments to which those casks were initially loaded. The NRC opened two unresolved items for this practice and the URIs were resolved, in one case to no violations, and in the other case, to two minor violations. While there's no specific prohibition on using licensees must still comply with the requirements of 72.48 and 72.146. It is important that changes made to the cask licensing basis have an appropriate regulatory justification and that the current cask licensing basis accurately describes the as-loaded configuration of the casks in the field.

One of these licensees have since stopped upgrading to the cask FSAR. Understanding the cask licensing basis can be very complicated, but it is extremely important, if licensees and CoC holders want to make changes appropriately under 72.48.

The last topic I intend to discuss is how the ISFSI can, in some ways, be dependent on the reactor, although there is typically no specific requirement or prohibition on incorporating programs for the ISFSI, as inspectors in the field, we often see licensees that are meeting ISFSI requirements by incorporating it into the larger reactant program. It can cover many difficult areas and take on a wide variety of forms. It is important to recognize when an ISFSI requirement is being met via a reactor program, especially before a reactor begins a process of decommissioning. It is critical to think about what specifically is still necessary for continued safe operation of the ISFSI, even as reactor programs and equipment may no longer be needed for the reactor.

Here are just a few recent examples of ways in which inspectors have seen in the field that the ISFSI is dependent upon some aspect of the reactor. These examples are not intended to be all-encompassing, but just food for thought directly applicable to any given licensee, and further, plenty of other examples of ISFSI reactor dependents beyond those I discuss here. The ISFSI may be dependent on the reactor for fuel storage. In one instance, the NRC issued a violation for licensees failure to maintain testing fuels selected for loading. In other cases, inspectors have observed that licensees may be currently maintaining these testing records but may not have explicitly determined which records will be required to be maintained until the NRC terminates the ISFSI license.

The ISFSI may be dependent on the reactor program for handling heavy loads, specifically during cask loading and of the existing reactor program, how those heavy lifts are being handled. There's a long history of control of heavy loads at nuclear power plants, and it is worth noting that for most reactor licensees, their response and their heavy loads program significantly predates any ISFSI loading or transport operations. The ISFSI may be dependent on reactor sources of power or backup power, specifically when that power is needed to keep the fuel at a safe and secure condition. It is worth considering the power requirements for the ISFSI in the case of a loss of off-site power and the timeliness with which that power may be necessary. In one case, a decommissioning licensee, while processing a dry storage canister, lost off-site power. In that case, the licensee started an emergency diesel generator in order to continue to provide cooling to the in-process canister.

The ISFSI may be dependent on the reactor spent fuel pool. Typically, it's used for Cask loading activities, and it may also be required for potential unloading activities, depending on the requirements in the Cask licensing basis. In one instance, the NRC issued a violation to a decommissioning licensee for failure to maintain a program for unloading fuel from dry storage after the decommissioning licensee was no longer able to store spent fuel in the spent fuel pool.

The ISFSI may be dependent on the reactor's fire protection program. If that program is being credited to evaluate, control, or respond to fire and explosion hazards related to ISFSI activities. In one case, although a licensee had integrated the control of combustibles into the reactor's overall fire protection program, the basis for the controls of combustibles at the ISFSI was not correctly based on the appropriate cask licensing basis, and the NRC issued a violation. Notification procedures. If the ISFSI has been incorporated into the approved reactor emergency the required emergency or non-emergency notifications. Many licensees have based their NRC-approved emergency plans on the guidance in NEI-99-01 for non-passive reactors.

This guidance includes emergency action levels for ISFSI events, which, in turn, depend on the specifics of the cask licensing basis. These are just some examples inspectors have seen of the ISFSI and the reactor programs being interconnected. It is critically important, particularly in the reactor programs and resources in order to ensure that the requirements for the safe operation of ISFSI will still be met. That concludes my presentation. Thanks so much for your attention, and I hope that these inspection insights will be useful in continuing to ensure safe ISFSI

operations. I'd be happy to answer any questions that you may have at the end of this session. (Applause.)

JEREMY TAPP: Thank you, Nicole. All right, while Marlone makes his way up, he has over 20 years of nuclear industry experience. Mr. Davis joined an NRC in 2003 as a Reactor Engineer and worked as an Inspector in Region IV and Region I. He was a Resident Inspector at a nuclear power plant in Maryland and served as a Senior Inspector in Louisiana. Prior to joining NRC, Marlone earned a Bachelor's degree in Nuclear Engineering with a specialization in Waste Management and Environmental Restoration from Kansas State University. He is currently a Senior Safety Inspector in the Division of Spent Fuel Management.

MARLONE DAVIS: Thank you for that introduction, and thank you, Nicole, for those inspection insights, operating experience, and I'm going to take a different, um, take on this and look at the, more of the regulatory experience this time. So, first, I would like to thank everyone for joining us today in spent fuel management. Normally, during my presentations, I have a lot of pictures. This time, I tried to use graphics to bedazzle you, to get you to look at some of these things, but I really wanted to focus on our theme, right?

Building on experience to improve spent fuel storage management, and that experience that we're going to discuss today, and as Nicole just, um, discussed is the operating experience and then the regulatory experience, right? My focus is on 72.48 evaluation process. For those who are unfamiliar with that process, this section contains requirements for the process for which a licensee or CoC holder may make changes under certain conditions.

This section contains conditions to their ISFSI facility, spent fuel storage cask, design procedures, or conduct tests or experiments, right? Evaluations in this context is the evaluation performed by the licensee or CoC holder to determine if that change needs NRC approval. We want to see if it meets a threshold, and if it does meet that threshold, um, the NRC just wants to see it. We don't say it's bad, it's technically wrong, we just want to see it, so just keep that in mind.

So, quick content, brief introduction and background, covering the purpose, what and who we inspect, and how we conduct these activities as far as 72.48 evaluation and inspections, an overview of our regulatory experience, and again, keeping with the theme of the conference, and then I'm going to do a summarize of our discussion and wait patiently for any questions.

Introduction, so, what is the purpose and success of this presentation? I always like to try to define a successful presentation. To provide a brief overview and discuss our regulatory experience and perspective, and I'm going to do that by going through the background, starting with the process on how the inspectors look at the, um, process, and then we're going to look at the endorsement and our status, um, of endorsing the new guidance documented in NEI-12-04.

I'm surprised this is the first time I've seen this, the ISFSI map during this whole REG CON. This

is kind of like a staple. It kind of shows our extensive, um, overview of what we expect as far as the general licensees, the site-specific licensees, and if you total up the numbers, there are 64 general licensees, 10 reactors, and 16 site-specific licensees, which a total of 90, 90 licensees that we're actually inspecting, and we're doing that with headquarters inspectors and the four regional inspectors, four region additional inspectors. (Off mic.)

MARLONE DAVIS: More than one, definitely. So, here are our certificate holders. Really, I listed the four main ones. NAC international, Holtec, procedures, and specifically, I highlighted or had in bold our review of 10 CFR evaluations. That's procedure 60857, ensuring that any required license or certificate of compliance amendments have been obtained, if they need to obtain those amendments. Again, it's the can I make this change, or do I need prior review and approval to make this change, and that's what we're looking at as a part of that inspection.

Then this slide, I tried to go into a little bit more detail, and really, the two takeaways I want the audience to take away is the, um, we sample, we do, we use a sample selection, and, um, we risk inform, and what can lead to an evaluation, or, I'm sorry, a violation, and so I'm going to go into detail with that. So, risk inform and our selection process. So, for us, and I'm going to give you an example, we recently did an inspection, when we looked at the biennial summary report, there were over 200, I'll repeat that, there were over 200 screenings and evaluations, and this was within a three-year period.

So, when we took a look at that, those summaries, we have to go through and take a sample from that, and so we used our risk-informed technique, which we looked at confinement, radiation shielding, and criticality, those were our three major categories that we looked at, and then we broke it down from there to additional ones when we were at the site. So, think about that, over 200, we only really, based selection, and of those, and I kind of summarized some of our findings that's in later slides, but few violations also, and, so, when I talk about violations, what can be a violation in the 72.48 space?

First, um, that you meet one of the eight criteria, or that you stop at a screening and need to screen in into a full-blown evaluation. So, those are the two areas where you can get a violation in 72.48 space. So, again, in our background and for our inspection guidance, um, we really endorsed the industry guidance throughout Regulatory Guide process, which is Regulatory Guide 3.72, and right now, it's NEI-96-07, Appendix bravo, and the date is March 5th, 2001, so we've been using that kind of separate it from the 50.59 space, and we want to have our own 72 space, and that's when NEI-12-04 came about. So, NEI-12-04 has been a work in progress for a long time, and we're going to talk about the status later on in the presentation.

So, again, the overview. So, there are three major areas, um, when you talk about 72.48. There's the applicability, there's the screening, and then there's the actual evaluation themselves, and what I'm going to do is provide some perspective on each of those three areas. Again, nice graphics, right? No pictures, but graphics this time. So, for applicability determination, this is where, sometimes, the licensee or the CoC holder make a decision in the

applicability, whether or not you're looking at maintenance, you're looking at a non-conforming or degraded condition, or you're looking at a temporary modification.

So, the applicability determination is very important to see whether or not you need to go into this change process, or do you need to be in the emergency planning process, or do you need to be in the fire protection process, and in Nicole's presentation, she kind of gave you food for thought of all those different areas or programs where they might be a part of the Part 50 in general licensing space, and in site-specific, it's relatively easy, because you're really in 72 space. So, again, the applicability determination, and what we are finding, they want to use as is, so they find a non-conforming or degraded condition and decide to keep that particular thing.

So, do you need to be in a 72.48 process? That was kind of a question. (Laughing.)

MARLONE DAVIS: Or do you need to be in your corrective action? And if you're in your corrective action, are you still using 72.48? So, those are, again, food for thought of when people get tripped up in the applicability determination. For the screening process, um, normally, the screening process, you won't find in any regulation. It's, say, more of a procedure-driven by the licensee and CoC holder, so as part of our inspection activities, that's what we're looking at, do the licensee or CoC holder have a pretty good procedure to determine whether or not they need to be, they stop at a screening, or they need to screen in to do the full-blown evaluation, and, so, what we're normally seeing in this area is that licensees' procedures may not be adequate enough to get them to perform their full-blown evaluation, which, again, if you're not, if you stop at that screen look at those questions and see what impacts, um, that that change or modification is doing, right? And so you want to look at it on two aspects, for adverse effects or impacts, indirect and direct effects, and then for screening for method of evaluations, because we get a lot of violations in that area, um, inputs versus elements, what are inputs, what are elements, and what's the MOE, what's the MOE that's in a safety analysis, so you really have to think hard in question is a yes/no theme, but most, when they answer no, they don't have the explanation behind it, or they answer yes, they don't have the explanation behind it.

So, I'm going to quickly go sudden, it's credible, you might want to look at one and two, because those are some things that trip you up, because at this point in time, you said this would never happen, and then, all of a sudden, it happens, and a lot of licensees and CoC holders kind of gloss by that. Another one, again, looking at the direct and in effects on that change or modification, and if you don't meet a standard or code that you're committed to, again, you need to look at criteria one and two, because if you don't meet that code, or the GDCs in Part 72, Subpart F, you might want to look at those, um, in more detail. So, for three and four, consequence equals dose, and you're looking covered by Part 20, and that's how the guidance is written, so you want to make sure that you take four. For five and six, again, non-credible to credible, you want to take a look, because you might be introducing a new malfunction or new accident when you said it was non-credible, now it you're looking at safety limits or design limits either being exceeded or altered, so if you make a design change and you need to reduce your heat load, um, that means, from the design limit, and you've altered it and say, well, we can't

load to the 44, we really should maintain administrator controls at 32, at that point in time, you just altered your heat load, and you need to take a very close look at, um, criterion seven. So, for criterion eight, the method of evaluation, which non-conservative. If you're changing from a new, from an old evaluation to a new evaluation, you want to take a look at that in a little bit more detail, and the one that always trips, um, a lot of licensees and CoC holders up is the applicable terms, conditions, and limitations.

I'm going to repeat that. The applicable terms, conditions, and limitations of which the NRC have made limitations, you might want to take a look at your MOE in more detail. So, our regulations, which we have identified a number of violations in this area, CoC holders using different MOEs from one amendment to another amendment, but there's hope, there's the regulatory progress, again, we're working on our regulatory experience and improving spent fuel management, and our new amendment.

We always wanted to keep the amendments separate, right? Amendment one was to amendment one, amendment two was amendment two. Amendment one, you couldn't use amendment six, thermal analysis, but now, we're looking at, for CoC holders, with their design, to be able to move from amendment to amendment, and I think that's going to come out in the new guidance that we're going to endorse. So, there's, again, we're learning from our regulatory experience and improving in our spent fuel management. Another example, and I think, um, Nicole has spoken about, again, method of evaluation that's in the safety analysis, the final safety analysis itself, um, where if it's an MOE, which is a calculation, a calculation can be one plus one equals two, that's a calculation, that's an MOE, if you want to make changes to that and it's in your safety analysis, you have to, um, really take a look at that. The second one is screenings and evaluations, and again, um, Nicole gave some examples of where, um, licensee, or certificate holder in this case, stopped at a screening and didn't do the full-blown evaluations, and we see a lot of that, and again, from our aspect, it's either the procedure was inadequate, or they just didn't quite understand or follow the procedures or didn't fully invest in the direct effects of what the design change affected or adversely affected.

For three, for the applicable criteria, I think that's self-explanatory, and I tried to run through of what we're looking at from our perspective as inspectors. 72.48 Charlie 2, again, if you trip a criteria, um, that means you just need to come in, um, and seek an amendment, or we need to review it, and then the fourth one is non-conforming and degraded conditions, and it was interesting, yesterday, um, a question was asked about, um, if you're doing agent management, you need to repair a well, what are you going to do, and I think two CoC holders said, well, you're going to put in another, um, cask, and so the question was do you need an amendment? Is it a corrective action?

And again, when you talk about use as is, degraded, non-conforming, or is it apart of the corrective action or compensatory actions, until you do the final repair, you need to really look at that, because your 72.48 process is affected at that point in time, because now, you've changed the design. You may have looked, so you need to look at heat load, you need to look at a whole gamut of things, and so that was amendment, um, degraded, non-conforming conditions,

corrective actions, and compensatory actions is when you want to use 72.48, okay? So, the Regulatory Guide 3.72 update, right now, we've completed our draft guide, and the staff expects that the draft guide to be out for public comment within the next six months, hopefully. That's with fingers crossed, toes crossed, everything, so, hopefully, we can get that done soon so the guidance will be out there. Then just a quick summary, again, our review of 10 CFR 72.48 evaluations, and again, those four areas, method of evaluations, um, meeting the applicable criteria in Charlie 2, screenings versus evaluations and non-conforming and degraded conditions, um, when you're using those processes. That's all I have, Thank You. (Applause.)

JEREMY TAPP: Thank you, Marlene, for those graphics/pictures. Appreciate that. Next up, we have Carla Roque-Cruz. She began her career with the NRC in 2002 in Region Three where she completed her Reactor Inspector qualification and work in the Division of Reactor Safety. In 2006, Ms. Roque-Cruz moved to NRC headquarters and has held a number of responsible positions, including Technical Assistant and Reactor Systems Engineer and NRR. In 2016, she joined the Division of Spent Fuel Management as a Storage and Transportation Safety Inspector. She earned a Bachelor of Science in Engineering degree in Mechanical Engineering from the University of Puerto Rico and is a graduate of the NRC's Aspiring Leaders Certificate Program.

CARLA ROQUE-CRUZ: Can you see me? I know you can hear me, but can you see me? Oh, look at that. Did you know this could do this? (Laughing.)

CARLA ROQUE-CRUZ: Thank you. I can see you. All right, so, my name is Carla Roque-Cruz, and yesterday, we were spelling our last name, so I'm going to do that, just because it's a little bit, um, different. It's Roque-Cruz. I'm an Inspector in the Division of Spent Fuel Management, and we're going to talk about insights from the temporary instruction inspections. I want to say, if you've been, um, if you were here last year or the past few, um, activities that we've done, you've probably seen some of these slides, because we've been talking about this temporary instruction before, but there's some new slides, so just stay there, stay with me, it's going to be something that you've seen before, but then we're going to get to the new stuff.

Um, the purpose of this presentation, again, like I said, is to, first, give you a status of where we are with the implementation of the TI, the temporary instruction, and to tell you some of the insights or the, um, things that we've seen in the two, um, inspections that we've completed. There's going to be four total, and we've done two. Oh, can you go back, please? If you can tell me what all the ISFSIs are that you're going to see pictures of, you win. I don't have a prize for you, but you win, so you better be paying attention. Look at the pictures, and then at the end, tell me which sites are those.

Okay, next slide. So, what we decided to do with this whole aging management program in order to develop our inspection procedure was to do a two-tier process. So, we decided let's do a temporary instruction to gather information, and then when we get the information all together, we'll use that to develop the inspection procedure. So, and now this year, we're doing these TI inspections. Selection criteria, you've probably, again, you've probably seen this, and this is

what we, um, use to decide which sites we were going to go to. So, no, we did not go to the site because we have something against you, that's not the reason, we had these criteria, and we used it along with, obviously, availability of the inspectors, of the people at the site, to be able to say these are the sites we're going to go to.

As you can see, we wanted different regions, different types of cask designs, a site that was licensed prior to the SRP, so that's what we used to say these are the sites we're going to, and again, we went to, we decided to go to four sites, we already went to two, Prairie Island and Calvert Cliffs, and we're going to talk more about those.

Now, the contents of the TI, and this involved with aging management, you've probably seen these ten elements in the SRP, which is NUREG-1927, didn't put those as reference, but if you want the ML number for those two documents, they're publically available, just ask me at the end, I have them written somewhere, but again, you've seen these, and that's what we use in our TI to do our inspections. We go, and we look at these ten, um, areas. So, this is the new part, and there's another photo in there. So, the first TI that we went to was Prairie Island. We did that inspection in April of this year. There were three inspectors, or two inspectors and one technical reviewer, so three NRC staff.

For this TI, we were there at the same time that region three was there, doing their loading campaign, so our entrance and exit meeting coincided with theirs, so we did everything together. We, the, um, we're not putting a report out just for the TI, we give our input, and they add it to their inspection report, and as you see, that inspection report was already issued, so that's the ML number, and then what we do when we go to the inspections, it's a combination of document review and visiting the ISFSI and talking to people, um, interviewing staff, so that's how the inspection goes.

The next one that we did was Calvert Cliffs, and that was two months ago, October 10th and 11th. This time, it was not during loading campaign, it was just, um, the TI, and it was two inspectors, or one inspector, one technical reviewer, and again, a combination, we reviewed documents, we visited the ISFSI. In this case, they have a transfer cask, so we also visited the location where they have that transfer cask, and then we talked to staff. That's basically what we do. So, this is, like, the interesting part, right?

So, what have we seen so far? Um, first, because this is a temporary instruction, not the inspection report, we did not identify and document any findings, we're just there to gather information, and then at the end, when we have our ISFSI meeting, we give our observations and our feedback to the licensee.

Both of these programs were adequate, we had no concerns, but there's always room for improvement, and so we go and we tell them, you know, we saw this, maybe this is something you can work on or improve, so that's what we do, but we really are just getting all the information that we can so that we can later use it to do the inspection report. So, one thing that

we saw, I really liked this, um, and thank you, Jeremy, for telling me how to say that word, use of document hierarchy, showed me how to say it.

So, we really like this. It really makes it easier for us to understand your program, and we noticed that, usually, there's, like, a basis document, like a main aging management program document, and then from there, you see the different aging management programs that they have, and then each, um, element, so that's usually what they do, they just have each element, and under each element, they tell you what inspections they're doing, what inspection procedures are they using, so that makes it really easy for us, or easy, not really, but easy for us to be able to understand the program once we get to the site and we're trying to figure out what things we're going to look at.

The other thing we found, and I thought it was so adequate, or I know there's another word, I don't know what it is right now, but I thought it was great when Nicole mentioned about taking credit for established reactor programs for the AMP, because this is something that we've seen, right? So, you have, um, acceptance criteria, your inspection, a walk-down, but you do it using an established procedure that you have at the site, or a routine inspection that you have at the site. Well, guess what?

That inspection that you usually do at the site may not have all the criteria that you said you were going to look for aging management program, so now, you're not really meeting your program, because you said you were going to look at these 20 things, or that if you found this when you did your walk-down, you were going to initiate a corrective action program, and when you did it using a routine inspection that you do at the site, the criteria was different, what told you what to do, or if you needed to for, and for example, the one for acceptance criteria is the one that says this will tell you what will trip your threshold or your criteria so that you need to do something else, so if your aging management program says that any stain, dot, mark, anything that you see, you're going to document it and bring it to this other person, then that's what you have to do. You can't use another procedure or another activity that has less than that and go with that one, because you're not meeting your criteria.

So, again, it's using reactor programs or established activities, which is perfectly fine, but you have to make sure that you close back the loop and that you're doing what your AMP program is telling you to do. Again, the second one is also very similar, but in this one, I just want to mention, if you have an aging management program procedure and you have an, a routine inspection that you do at the site, and you have a procedure for that, then try to be consistent.

If you wrote, if you have that AMP procedure, use that AMP procedure. If you, sometimes, in the basis document, you can have, well, we can do this activity using this procedure, but then in another page, you're having the same activity you see in a different procedure. It's a similar procedure, you wrote it basically for the same thing, but now, you have two documents in your basis document. If you need to revise one, did you remember to revise the other one, if you're going to use them both?

Again, just trying to keep it consistent. It just makes it easier for the licensee and for the inspectors, when we go do inspections, and then documentation. If you're using a routine inspection or a routine reactor program and you are taking credit for that, then make sure that when you document that you did that inspection, you also document that you will take credit for that in your AMP program, and I think one of Nicole's examples was you can find documentation of something that you did.

Again, perfectly fine to use your reactor programs that are already established, but you have to, if you're taking credit for it for aging management program, then you have to document, this is my, this completes this aging management program activity. So, those, it goes back to the same, yes, use your, um, established programs, but just make sure you close the loop, just make sure that you go back and that you're doing what you're saying you're going to do in your aging management program.

Easy, right? So, next steps. Like I said, we did two inspections already. The next two inspections are going to be in 2019. Marlone Davis is going to be the inspector, and then there's going to be another inspector from Region Two. Then once we have all those inspections completed, we have all the information, we will then work on developing the inspection procedure for AG management.

MARLONE DAVIS: I do want to add one thing. We're going to combine Oconee and HB Robinson as one inspection, and then our fourth inspection will be for general licensee, because we wanted to give them enough time to, um, provide that clarification.

CARLA ROQUE-CRUZ: Thank you, Mr. Davis. And, so, for summary, so, what's in the past? What did we do? Well, we used the selection criteria that you saw and selected four sites, and then we're going to select one of the general licensees to do the TI. What are we doing right now? Well, currently, we are performing the temporary instructions. And then what's ahead of us is to develop the inspection procedure upon completion of the TIs. I'm done. Thank you.

JEREMY TAPP: Thank you, Carla. Did everybody get all those sites from the pictures? All right. A few were named, I think, in the slide itself. All right, well next up, we have Neil Fales from the 3 Yankees, and I want to extend a special thanks to him for short notice, getting a of last minute, but we appreciate him. Neil started his nuclear career at Maine Yankee on the re-racking project and then hired on as an auxiliary operator.

After the plant shut down, he worked at Cooper Nuclear Station for four years. He worked at General Electric for two years as a Thermo Design Engineer before returning to nuclear at Vermont Yankee for 13 years as an Assistant Engineer and then a Code Programs Engineer. Currently, Neil works for the 3 Yankees as the Aging Management Program Owner. Welcome, Neil. (Applause.)

NEIL FALES: Okay, I will like I need to raise the, um, the podium. Not making any judgments, just raising the podium. (Laughing.)

NEIL FALES: Okay, so they wanted somebody to speak on the perspective of the AMID user, someone like right now. So, a little on the purpose of the database and where the website is. So, the utility is typically going to be the first to encounter something, something that warrants being shared with the rest of the industry, and the AMID database is that conduit.

Just like an operating plant, we want to share so that other plants can learn about something before it becomes a problem for them. AMID is managed by Certrec and located at the link on the screen. So, this is the screen you would be working in, looking for OE. At the top, we are currently in the AMID tab, and in the middle is some search criteria, so you can screen out what you want to look for.

At the bottom, you see the first two entries of a total of 15 in the database so far. If you double-click on one of those, you get a lot more data. So, here's the entry I worked on for, um, an inspection at Maine Yankee in 2016. Most of these are drop-downs. You go through and select what's most appropriate for your inspection or whatever it is you want to create for.

So, you have the storage technology, what it is you inspected, um, what you found. On the right-hand side, if you scroll down, you see more of this entry, you see, you can put in data, and at the very bottom hand of the right screen, you see a description tab, this screen-shot shows the, as much of this description tab as I could show on the screen-shot. I encourage people who are making an entry to put as much as you can in the description tab.

The drop-down menus only give you so much information, and they may not be applicable to your information, so the description gives the full story. Second from the bottom is the, um, spot where you can pup files. I encourage that also. In this instance, I put a summary of the inspection and some pictures, and you also notice at the bottom, um, is a vendor approval checkmark. The CoC holder is the one that reviews this and, um, actually puts the checkmark in for approving it to be entered into the database. It's primarily to look for proprietary information, but important to note that you need to work with your CoC holder, your cask vendor, in putting this into the system.

So, this is a summary of what's in AMID to date. There are 15 entries, 10 of them are from utilities, they're all inspection results, and at the bottom, I've noted that there's, um, 5 entries that NEI has put in for reports that have to do with, like, CISCC, aging management programs, vulnerability assessments, things that have to do with ISFSI sites. You can see the dates range from, um, 2008 all the way up to, um, September of 2017.

We do have a pretty good host of storage technologies. The type of inspections range from doing demos for tools to, um, actual AMP inspections to different types of commitments that site may have had, and the components inspected are, obviously, the overpack, the canister, or both. So, what's the process for some event getting into the database? Um, the general licensee finds something, does vent to be through an inspection, might be through operator

rounds or security rounds, might be from an event, but it warrants being entered into the database, we want other people to know about this.

So, they enter the data, just like in that screen you saw, and you get in touch with the CoC holder, they review it, look for proprietary data, and then put the checkbox for entering it into the screen, and if this database works the way it should, other sites are going to go in and say something that happened to you and hopefully take action and make sure it doesn't happen to them or have some idea of what to look for in an inspection, I'm going to take particular note of this in my inspection. So, as the aging management program owner, I'm going to, um, fill the role as the OE coordinator, like, um, operating sites have, I'll be making these entries into the database, getting in touch with the COC holder, and I'll be looking for OE that's out there, and that's not just looking at the AMID database, we found OE reports and notices, might be a call from a colleague at another ISFSI site saying, hey, have you ever seen this before, and then you determine it is something significant.

A little bit on the database effectiveness. So, this will be very useful when we're doing our OE searches, and especially for the toll gate assessments that we're going to have to be doing for NEI-14-03 for the aging management program, and from our perspective, as utility, we only want to see the significant events. If it's filled in with to clutter the database.

For instance, at the 3 Yankees, we do 123 separate inspections of the casks every year, and so if we're going to add that many data points in here, it's just going to dilute what's really important. So, um, we have some observations, a critique of sorts, and some questions to maybe prompt some dialogue. There are ten entries on OE itself and five technical reports. Does this seem about right to you? With the most recent being from September 17.

What should a threshold be for entering something? As utility, we're thinking, um, a good threshold would be if you have to write a CR in a license component. Should this just be limited to the cask and canister? At the 3 Yankees, our pad is a class C, our class Charlie, important safety component, so that might warrant being put into the database.

Something we deal with quite a bit, accident events, heat removal related, you can make an argument either way, but these are just you are putting in an entry, you need to work with your CoC holder, cask vendor, to make sure they know there's something awaiting approval. So, in the AMID right now, we have five technical reports. So, is this the right repository for that? If so, um, and should we put all of them in? You know, if there's things that would really help with the toll gate assessments, for instance, the reports from the national labs, should those go in there? If so, who's the custodian that OE, such as NRC information, notices?

So, when we did the GTC inspection in 2016, part of that was to respond to an NRC information notice on the condition of the gasket between the VCC and the lid, make sure it wasn't leaking, so that's a form of OE, something that people might want to know before they go into an inspection. Should toll gate reports be added? You know, this is something that, um, you'd have

to get a buy-in from both utility and the CoC holder, because they have to put the checkmark for approving it. So, that's my presentation. Thank you. (Applause.)

JEREMY TAPP: Okay, thank you, Neil. Appreciate that. A lot of good food for thought there as well for everybody. So, at this point, we'll open up for questions.

DANIEL MUSIATTI: All right. First of all, I would like to thank Neil. I have gone up one level in my Super Mario game of life. AMID is an acronym, which is really cool, because we love acronyms, but it's an acronym with an embedded acronym in it, so double kudos there. (Laughing.)

DANIEL MUSIATTI: All right, the floor is open for comments and questions. We have about a half an hour, don't we? About a half an hour. Question here. Hang on one second. Up in the booth, we seem to have a dead microphone here. Okay, they're live now. Thank you.

SPEAKER: I'd like to make three quick points. I don't have any questions. My first point is you've likely heard of AREVA TN Americas. First of all, I want to say there's never, ever any excuse for not carrying out the 72.48 process completely, accurately, and responsibly. Having said that, we're often asked, when we get into discussions with the NRC, why didn't you just send a change to the NRC for review, and the answer is, because of the rulemaking process and the time that it takes, and I know that for Part 71, there's no rulemaking process. We had a TN revision to Part 71-C completed in one day several years ago. I know that's unusual, but my point is the rulemaking process, and I know this because 72.14 lists all the amendments, and to change to a regulation, you have to go through rulemaking, so if we can make 72.214 and locate it elsewhere where rulemaking doesn't apply, we will come to the NRC more often, and again, there's no excuse, ever, to not carry it out responsibly, but that is a factor in this situation.

Lastly, regarding Nicole's presentation, the most awkward part of my job as licensing manager is the relationship between the part 72 CoC holder FSAR and the CoC amendments and their tech specs. As she pointed out, all the amendments are independent-approved designs, they have their CoC and their Tech Specs, they can't be changed, but they're all in effect and can be used, but if you read it, we can only have one, we update it every 24 months, but a solution there, I may live to regret this, would be to have an FSAR associated with each amendment period, and every 24 months, only those that change would have to have an update sent in, but that is a very awkward phenomenon, the relationship between here.

SPEAKER: I wanted to respond. So, what you're saying, we need to do some 72 regulation changes?

SPEAKER: Yes.

SPEAKER: Okay.

SPEAKER: 72.214. That is correct.

SPEAKER: Go ahead.

SPEAKER: I wanted to just amplify Neil's remarks, and thank you for taking the time to do that. It is very helpful. There is a, um, a user's guide for AMID, it's NEI 1610, does answer some of those questions that were posed, and I wanted to make sure it was clear that the purpose of AMID is for only aging-related OE. If there's other OE having to do with operations, fabrication, for example, that doesn't go into AMID, it should still be shared, don't get me wrong, but in a different forum, perhaps in another database -- buffering -- I think the other that, um, in the future, the, um, industry will, would like to sort of take credit for positive experience at other sites for sort of making the case whether or not you need to do an inspection at your site, and this is the subject of surrogate inspections, and the NRC staff has, um, is open would just, um, kind of make sure you're considering the incorporation of positive OE as in your best interest for in the future, if somebody comes in and says there's been 15 inspections of such and such, and nobody's found anything, and we can point to all of this data in the AMID to support that, you know, that would go a long way in the, um, discussions with the NRC staff. So, that's my, I guess encouragement to include positive OE for your, in your interest.

SPEAKER: So, if we're going to put the positive OE in, or every inspection, I would encourage some kind of a, um, drop-down, where you can easily filter out the stuff that you don't need to see when you're doing your reviews, so, you know, event, non-event, something like that., Germany, Spain, that really are working in this area, so anything that can be done, either from your inspection guides or from your database that could help, um, give more guidance to these developing countries would be appreciated, and we can give you the name of the person, or John could give it to you, who could put you in touch with Argonne, who is leading this effort .

DANIEL MUSIATTI: Okay. Thank you for that. Make sure your mouth is in front of that microphone.

NEIL FALES: Just to clarify, I think our, um, approach would be to put all canister inspections in the database, positive or negative. That certainly seems to make a lot of sense. The overpacks, that's a different story. Right now, we're required to inspect those annually, and we really don't see a whole lot of changes, so I think our threshold for something like that, as Neil pointed out, would be, if we write a CR on our overpack, it would seem to make sense that that might be something to put in. Otherwise, you're going to overwhelm the database, it's going to be hard to find the experiences that you really want to look at. So, um, that's just a suggestion. You know, we're feeling our way some feedback on that. So, thanks.

SPEAKER: My question is to Mr. Neil Fales. So, I noticed on your screen-shot for your database, you have one entry for the dose rate. I was wondering what that was. Was it a regular measurement or some kind of an incident? I think we had a lot of discussion, what should be getting into the database or what not. So, in the term of know, abnormal or some kind of exceeding the limit, so that's something we'll be very interested in, so I would like to hear from you why it would make it into that database, and is it just the regular, you know, measurement, or did something trigger you to do the measurement.

NEIL FALES: No, we happened to put a, um, radiation meter on the robot that went in, and so we got a direct radiation reading right on the canister surface. So, since there was a drop-down for that, that's what we put, was the actual, the highest reading that we found on one side of the canister, almost 90 per hour. So, since there's a drop-down, we decided to put it in. We did an inspection this past year, and, um, so when we put an AMID in for that, we'll do the same thing, we're going to put the very highest value on the canister itself. I don't know if this is the question you're getting to, but there were many different dose rates that we took.

Some were on the side of the plug off and were looking directly at the canister, and the inspector got out on to the canister surface, so the rad techs, um, took dose rates all around the periphery of that, in the center, to know what dose he was receiving. So, in the description, you could say, you know, when we took the shield plug out, we had a high dose between the canister and the VCC, and it was this value, top of the, um, canister. So, I don't know if that answers your question.

DANIEL MUSIATTI: You did. I thank you, and I think that's probably very useful information for us and gives us kind of a go to the, um, telephone lines and ask, um, Julie, is there anybody that's in the queue to make a Julie?

PHONE OPERATOR: At this time, I'm showing no questions, but once again, to ask a question, it is star 1.

DANIEL MUSIATTI: Okay, thank you very much. I'll check back with you later. Sir?

SPEAKER: We have operated a very long time and have many canisters loaded to many various CoCs, and therefore, many various FSARs. I think one of the biggest issues that I see, and I think others would agree with me, is that the match-up between FSARs and CoCs is something that's not very well-understood. I don't know what an answer is to it, you know, kind of like Don proposed, you know, because whenever the CoC gets issued, the tie to an FSAR is kind of nebulous, and that doesn't help to understand. So, again, I don't know what an answer is, but it's a real issue, and it causes a lot of confusion that we have to try and explain, um, to people, and I won't profess that we even keep it straight, depending on who you ask, but it's a good issue that we need to see if we can do something about, I guess.

SPEAKER: So, this question came into the program office, um, from one of our regional offices, and we asked OGC, we did a little background and research, and our conclusion, what we came to is, again, if you want to move from your, from the CoC amendment in FSAR, because they all came as one unit initially, and if you want to move to the latest and greatest FSAR, you have to do an evaluation, and, so, hopefully, Duke has been doing that evaluation, if they're using the latest and greatest FSAR. So, I just wanted to provide that insight.

SPEAKER: Thank you.

SPEAKER: I just wanted to expand on Neil's answer to Dr. Li's question. The dose rate field in AMID is one of several where we try to characterize the environment in the area of the inspection, so in addition to dose rate in that area, we have, I think, humidity and ambient temperature as well, so that's the context of that dose rate, Dr. Li.

DANIEL MUSIATTI: Okay, I don't see a vast number of people running to the microphone. Here comes somebody. Go ahead.

STEFAN ANTON: Going back to the question about the, um, amendment versus the FSAR, and I think, um, a licensing manager can confirm that, but recently, in the last couple of years, what we were trying to do is after an amendment is approved, to basically then create a version of the FSAR, even if it is outside of the 24 months period, that is consistent with this. So, hopefully, that the users would have an FSAR that is consistent with an amendment. Even that is sometimes difficult, but I think that might be, from our perspective, that was kind of the best the beginning. Did you give your name?

Stefan Anton: -Stefan Anton -- from Holtec.

DANIEL MUSIATTI: Thank you. Anybody else in the audience wish to make a comment? On the phones, do we have any comments?

PHONE OPERATOR: Yes. Thank you. We have a question from the phone. Chris Allen from NRC. Your line is open.

CHRIS ALLEN: Yes, I just wanted to ask a question regarding the, for the Maine Yankee representative, who had said, suggested a criteria be, for entering information into that system, be a CR. I was curious how things such as a near miss might be, might affect that, or whether you anticipate, um, near misses, um, being, information about near misses being communication.

NEIL FALES: So, your question is whether we should add near misses to the database? Um, if it's, in my opinion, if it's something that's worthy of the rest of the industry knowing, I'd say yes. You know, if it's something that almost happened and, um, we can help other people at those sites avoid it, I would say yes.

CHRIS ALLEN: Thank you.

DANIEL MUSIATTI: Anybody else on the phone?

PHONE OPERATOR: We're showing no further questions from the phone. As a reminder, for questions, it's star 1.

DANIEL MUSIATTI: Okay. Um, right now, it is about 9:30. I'd like to take a quick poll of the audience. How many people in here were pretty well convinced they were going to miss part of

the end of the meeting because they had to leave for a flight or some other transportation? Several. Maybe about, okay, maybe about 10 percent of us in here. Um, normally, as you heard me say yesterday, what I prefer to do is to stick to the schedule that we published, because people that might want to come in for a specific segment are looking for that segment to start at the time that's on there, but on the day that we bug out to go to the airport, it, um, we'd rather have the people get the full treatment in the room, if at all possible, so I'm amenable to moving the 15-minute break up till now and starting at about 9:45 AM. We can push through the day and make sure that we cover as much as possible here. How much agreement do I have with that here in the room? A forest of hands. Okay, I think we will do that then, unless there's a question either here or on the phone now for this topic, I think what we will do is we will reconvene here at a quarter till 10:00, which is a minute or so short of the, of an actual full 15 minutes, and get started with the next session. So, thank you very much.

MICHAEL CALLAHAN: Our appreciation to, um, Michael Layton and John for making this slot available to us to give you some, give some observations and food for thought as we move forward in the effort to manage spent fuel, but I do also want to express my appreciation, and I think all of our appreciation should go to Haile Lindsay. He's the person that actually was patient enough and worked with all of us to put this together, so by the end of the day, please express your thanks to him for putting this effort together.

Um, if you've got the agenda, you'll see there's a fairly disparate number of topics, and, of course, you see that there are topics you might wonder what do these have to do with spent fuel management, and what we'll attempt to do today through presenting a series of topics, experiences, and case studies is try to impress upon all of us, both on the industry side, the NRC side, and stakeholder side, that once a plant files its notification to permanently cease operation, the mission becomes spent fuel management. Decommissioning is an important, and at times, a controversial step, along the way, but this happens along the way and be dialed into what happens along the way in operations and in members are at, the Yankees, SMUD, Dairy Land, and others are joining, that they all look alike, and that we don't inadvertently, or intentionally at times, create imbalances between what you all will be left to manage should we remain in the at former reactor ISFSI sites. So, that's what we'll try to impress upon everyone today and some suggestions as to how to work going forward. Um, but what we always try to do, because we all, the Decommissioning Plant Coalition always has questions of who are you, there's no one better to express that, give you a briefing on that than Bob Capstick.

He's got over 30 years of experience in the nuclear power industry, and he's currently the Director of Regulatory Affairs for the Yankee Atomic Electric Company, um, the 3 Yankees. He received designer graduate degrees in Political Science and Physics from Boston College, Master of Public Administration from Suffolk University, Graduate School of Management. He's a treasured member of the DPC. We count him as a friend. Bob, if you'd give the history, we'd appreciate it, and our current initiatives.

BOB CAPSTICK: Appreciate that intro. So, first, I'll start with a brief background of the decommissioning plant coalition, which is sometimes members, and as you can see from the

slide, over time, we've added a few more members. This slide shows that, um, the number of decommissioning, decommissioned, and announced shut-down nuclear power plants -- buffering -- there are a number of, um, members of the DPC that are on that slide, and a number of those are, um, across the country, so that's all I'll say about that. So, the three primary purposes of the decommissioning plant coalition are to, um, work to hasten the day when the spent fuel and greater than class C waste stranded at our sites is removed. We also want to address the challenges and concerns of the decommissioning plants and the independent storage sites, and we also engage with industry on issues that impact the decommissioning process and extended dry cask storage. So, there's several primary objectives of the Decommissioning Plant Coalition, to ensure that NRC regulation of our sites is based on the significantly reduced risks following permanent shut-down, as well as to ensure that the decommissioning rulemaking does not adversely impact sites that are now undergoing decommissioning or those that have decommissioned their plants, moved all the fuel to dry cask storage, and are considered ISFSI only.

As mentioned on the prior slide, um, we're looking to accelerate the federal government's removal of the fuel and waste from our sites pursuant to contractual obligations, and we're also looking to secure a pilot project or projects for consolidating interim storage with priority for spent fuel from the recognition that the decommissioning process considerations are being overtaken by spent fuel management considerations, and an awareness that there's a shift from safe store to Decon as the preferred option associated with the new business models, and we bring decades of experience that informs the knowledge that some initiatives are helpful and some initiatives are not. So, our decommissioning rule and guidance initiatives. We're looking to avoid unintended, or potentially intended consequences that are necessary, that are unnecessary or detrimental to the safety and, um, efficiency of the operations. We've also been interacting with the, um, Commissioners and staff recently involving four letters and seven drop-ins with Commissioners, with the EDO, as well as, um, some of the senior staff regarding decommissioning rulemaking, as well as other subjects associated with extended storage.

So, lastly, our ongoing efforts are to continue to engage and articulate positions and recommendations on regulatory issues that are impacting decommissioning plants, as well as the, um, shut-down storage sites. We continue to apply our experience with the decommissioning process and on-site spent fuel storage until the material is removed and the ISFSI facilities can be decommissioned. I guess the last point I'd like to make, um, is to emphasize that a nuclear power plant site cannot terminate its license until the spent fuel and waste is removed and the fives facility is decommissioned. So, all the decommissioning rules, regulations, and guidance continue to apply to ISFSI-only sites until the final license is terminated. Um, with that, thank you for your attention. (Applause.)

MICHAEL CALLAHAN: Next, I'd like to introduce Paul Plante, who, um, probably needs little introduction before this great group, but he is the Cask re-licensing product manager for the 3 Yankees and is responsible for re-licensing activities associated with dry cask storage systems that Connecticut Yankee, Maine Yankee, and Yankee Atomic. He has 40 years of industrial

experience, 28 years working in nuclear power industry, and, um, over his career, he's managed different projects. Paul, if you tell us about the recent inspections, we'd appreciate it.

PAUL PLANTE: Neil got this thing up pretty high. Thank you for this opportunity to talk to you about the inspection we did in July. Presenting on behalf of the NAC technology users group, which is a consortium of utilities that use NAC technology, and we're the sponsors of the pre-application inspection that was conducted at Maine Yankee. I'm a pointer, so I'm going to try to do a little pointing here and talking at the same time. Maine Yankee, the open ocean's about 12-miles away, this is where the reactor site was. As you can see, it's gone, it's green field now. We have our 64 canisters, and this is the building that we call home, and generally speaking, live out of.

Our protected area has been shrunk down to that footprint right there. So, just a general background, NAC is the certificate of compliance holder. It was for an initial 20-year license period. The MPC system, which is used at several plants, has an expiration date of April 10th, 2020, and the UMS storage system, which each other, but we kind of treat them in the same, together. The users are listed here. These are all UMS system users, and these are all MPC system users.

We used susceptibility criteria on all of the dry storage systems that we're talking about, something in the neighborhood of almost out on the pad, some of the lowest heat loads, some of the highest numbers in terms of, um, Z ISFSI, which isn't really too high, it's 2, but the V can we used was 5, and that's the highest of all the canisters that were analyzed. Actually, I should say there were several canisters that had 5, so we wound up picking one that really had the longest time on the pad and lowest heat load. So, the, um, pre-application inspection attributes that we used, we used draft AMPs that we'd been working on for the past year and a half, um, the AMPs are based on a draft MAPS document, so we're kind of waiting for the maps document to get finalized, but we went at it with the best information we had available.

They included a localized corrosion, stress corrosion cracking of welded stainless steel AMP, draft AMP, an internal vertical concrete cask metallic component AMP, and a reinforced concrete structures AMP, and it was all performed in accordance with NAC's quality assurance program. The model we used is the utility, the users group hired NAC to perform the pre-application inspection and allowed them to control that activity. So, we'll get some pictures. This is a typical VCC here, concrete overpack, just for anybody that isn't pedestal, and these are inlet vents, and this cutaway, those are inlet vents, the outlet vents are here, and this is about 2.5-foot thick of concrete.

This entire inner surface passageway is all coated with steel, and then the canister, it's laying on its side here, but typically, it's standing up straight, has a 5/8ths inch thick shell. It's for, it's a transportable storage canister, so it has more than storage-only canisters would be expected to have. This is a top view, where the spent fuel assemblies go and the fuel tubes are, and then you have a shield here, which is 7 inches thick, and then you have a structural lid here, which is 3 inches here, and Maine, what we tried to do, or what we generally thought as a best approach

is to scaffold around the cask of interest. That takes us about a week, to bring in the contractors that do the scaffolding and set it all up. They also provide our crane services. We're taking off the shield lid and the, um, I'm sorry, the, um, the VCC lid and the shield plug that sits underneath that lid, we take those off to get access to the canister. These tents here are typically where the robotic inspectors setup their equipment, and we have cameras that put a feed into there.

We also have a feed that's put into our conference room so that visitors and others can just sit there and watch what's going on the big screen TV, which is, you know, much more comfortable environment than out in one of these tents. Then this is a view of, um, of the top of the canister. The lid has actually been removed from the top of the VCC. You can see the dirt that accumulates right up to where the gasket sits, the gasket sits right here on this clean surface, and this is the dirt that comes in over the years.

This canister was put out on the pad in 2002, so it's had about 16, 17 years or so of service. The inside, this is generally protected from the elements, it's pretty clean, these little black specks are dead flies that somehow seem to find their way everywhere, but, um, nothing really concerning there. This is actually the top of the TSE. Once we've removed the shield plug, this is the condition. You can see that there's some, a pattern there. There's, um, here, where there may have been some, um, liquids from the loading process that dried off, you can see the, um, the name plates that are associated with this TSE. These threaded inserts here, those are the points where you would lift this canister later on, so those threaded inserts are in there to protect those lifting points, and you'd just remove those and inspection going on.

As Neil pointed out in his talk, that, um, the visual inspector preferred to exposure was carefully controlled, I think he picked up less than 10 MR, I think Neil is saying 4 MR total for that activity, I think he was out there some, you know, 15 to 20 minutes, doing this inspection, so it was a fairly low dose. He actually has 10 inches of shielding between him and the top of the gasket, so it's really not that big a stretch, and some of these gaps that you see here, you want to avoid.

There were some gaps that had dose rates of 1.2, and they went down from there, so it all depended on which, um, which part of the perimeter of the cask you were measuring, but it was all fairly well-characterized, and this was determined to be the best way to go about doing these inspections. Then the robotic inspection, that takes place by going in through these outlet vents. We simply unbolt them and rotate them 90-degrees, so that we can create a pathway for the robot to go in either one of these sides, and it'll go down the inlet vent, or the outlet vent, excuse me, and then transverse the downside of the, um, the inside of the cask. Then this is a picture of the robot coming into the, or the ROV, as I like to call it, coming into the edge of the outlet vent, and so it's got one more turn to negotiate.

The first picture is at the edge of the outlet vent, the second picture is he's negotiated that turn, and he's now traveling down the inside of the steel liner, and the way he can do that is he's got these magnetic wheels that stick to the steel and help control the positioning of that robot, and then they can pretty much, once they get on the inside, they can pretty much drive it anywhere

they want. We don't have any, um, support ribs in either of these two designs, so it's pretty much free sailing once you get past that.

Then this is kind of what we see when we come around that corner. We see a fairly wide angle of view, we see the canister, which is up here at the top, and then this is all that VCC, the inside of that concrete overpack, which as you recall, I mentioned that was a coated steel, and it's a fairly unremarkable surface, and it has, these cameras are, like, 4K, so they really pick up pretty much everything, and you see every minor, um, blemish, not blemish, they're not really blemishes, they're just processing. The welds are typically made, and then they're typically polished aground, and they actually stick up pretty well as well. We wrote one CR on this inspection, and it was on some unusual coating damage that we picked up, which you can see right here. That has been that way for, um, the last 16 years, we believe. That was actually, our assessment of that was it was poor surface prep right there.

The coating really didn't take and sit well there. It's a very dry environment inside this cask, even with the low heat load cask, we're not getting a lot of, um, what you would call moisture in there, and that low heat load tends to, um, keep things dried out, and that's why this coating environment in there, I would expect it would have progressed further than it has so far.

Then this is Neil's arms, he actually setup a template there, and he's taking some chemistry samples from the top of the VCC. We took a number of samples and analyzed them ourselves, and then we sent, like, 15 or 20 samples off, and they did their own analysis of those as well, and I'll be reporting on what we found but let the Sandia folks report in their time. This is some of the results that we came up with. This table is, um, very busy, but some of the things to point out us an instantaneous reading.

It's an echolometer device and measures the total salt level at that particular location. It's a pre-sized pad and gives you readings in micrograms per centimeters squared, which if you look at the conversion on the bottom is equal to 10-milligrams per meter squared, which is where you'll oftentimes see salt concentrations reported as well, and we also take that pad and will send it off and measure it at a lab for chlorides, nitrogen, nitrates, and reading on the echolometer pad, and we won't do the math here, because we'll run out of time and the moderator will not be happy with me, but you can look at it in your leisure, because it'll come out with the, um, other presentations, and they don't add up one to one, but they do come out relatively close. It gives you a pretty good indication of, you know, right there and then, you can take an instantaneous reading of the salt-loading, and then when you compare it to the lab the only other thing I want to say about this particular graph is that the, um, the numbers are quite low.

Remember, we're 12-miles from the open ocean, so it's really not a kind of a site that you would expect to see very high numbers, and we've compared them to other numbers from other numbers that have been reported for Coberg, which are two or three orders higher of magnitude than these. This is a picture of the robot. They actually outfitted it with a rad monitor and an RTD, it's outfitted with inspection cameras, obviously, and hopefully, someday, it'll be outfitted with repair tools, despite the pessimistic setup we had yesterday when I asked that question,

but perhaps we'll be going in that direction at some point, if need be, and that's not necessarily a given, but right now, um, you know, that's some of the things that we're looking at.

So, we did send the robot down in with the RTD and the rad monitor on, attached to it, and what you see here in this picture is the temperature probe being pressed up against the bottom weld, that's the bevel of the bottom of the canister, that's a stainless steel plate it sits on, that's the coated steel pedestal that the stainless plate sits on, so it's being pressed up against the bottom of the canister, and we're getting a temperature reading off of that area. We thought inside of the canister, and we're reporting those readings as well as part of this presentation.

I think for the most part, the highest numbers you're going to see are 311 per hour, which is at the midpoint of the canister, which is what you'd expect, that's the midpoint of where the fuel is, and so you'd see higher readings there. It drops off into the 80 per hour for, um, you know, this particular side, and then the temperatures that we've got for, um, I think you see some that are, um, 115, I think is one of the higher temperatures we had, it was a 76-degree day, and our temperature monitoring was averaging about a 9.4 percent, 9.4-degree increase in temperature at the, um, outlets, or the outlet vents. So, you know, that's some information, and it was, really, we went, sent a robot down each vent, the south, north, east, and west vent, and you can study that at your leisure. So, in summary, um, the inspection coverage met the desired 80 percent of our visual inspection coverage of the entire circumference outer surface of the canister.

We estimate we got about 95 percent on the shell itself, about 85 to 90 percent of the shell welds and the heat effected zones. Those were a little more tricky, especially down near the bottom, but, um, we still had very good coverage for that, and then about 95 percent of the VCC liner in the interior surfaces. There were no areas of concern on the canister. There was one area that we showed you of paint deterioration and localized corrosion on the liner. It was evaluated using our condition reporting system. Salt-loading measurements were taken on the top of the TSE, and the results were somewhere between 2.9 and 11.4 micrograms per centimeter squared, depending on the technique used. Contact temperature measurements were made, and they varied between 84.5 and 116°F. Those rates were measured, they varied between 11.05 and 311 per hour, depending on the location of the canister, and the canister appeared to be very dry on hot and humid summer days. So, that concludes my comments. Thank you very much. (Applause.)

PAUL PLANTE: I'd just like to know where you got that light saber that you were using up there. I want the name brand of that thing. (Laughing.)

MICHAEL CALLAHAN: Thank you, Paul. Next up today, we had hoped to have Phyllis Dixon from, um, Crystal River in-person to deliver some, um, very good and a very wise alternative in her situation on community engagement. She had some dental surgery about ten days ago now, I guess, which is going to preclude her from flying, so she was going to give the presentation by audio, except the effects of the surgery weren't off yet enough for her to actually, um, go through the whole thing, so she's given me extensive notes. I'm going to stick to those notes, but I will tell you that we owe her a great deal of thanks.

She's a, um, she is the Decommissioning Technical Support Manager at Crystal River plant. She's responsible for overseeing the engineering licensing regulatory affairs corrective action program, revision of site procedures, site document control, and records management. She earned her Bachelor of Science degree in Nuclear Engineering from University of Tennessee. She also completed her Senior Reactor Operator certification for Crystal River in 2000. So, Phyllis, I hope I do your presentation as well as you do. I doubt that I can, because you're excellent at this.

Next slide, please. This gives an overview of, um, what we're going to, um, discuss today. I think the first consideration with respect to what Crystal River came up with was the political climate. What is the site/company's relationship with elected officials at the local, state, and federal level? Has there been vocal support, or have there been opposition from elected officials?

Do they routinely participate in public comment periods or public meetings held by the NRC while the plant was in operation? Is there an active stakeholder/intervener presence in the community or state? How have the interveners engaged with issues associated with a plant arose? Is the level the public, including local business and government workers, actively show interest of the site? How well-attended have the meetings been? What are your stakeholders' indirect interests? Do you your stakeholders? Regardless of the approach taken, it's important to use, assure that the across the DPC's community engagement perspective is to be transparent, no surprises.

Now, this slide is not inclusive of all decommissioning plants, but it demonstrates that there are a wide variety of models in use, and some, such as Vermont Yankees, were created by legislation. At Crystal River, they had a favorable political environment, or at least it was neutral. The community viewed it as a good neighbor, the county relied, of course, like most plants, on the contribution to tech space, and Crystal River began by reviewing experience that others have had in, um, formulating their community engagement plans, but most significantly, when they reached out and had a community stakeholder event, the turnout was 32 people, but they went forward beyond emergency planning zone when the reactor was operating for the site.

When they were asked during the survey what concerns they had about decommissioning of the plant, there were no nuclear safety or spent fuel management concerns expressed. It was primarily concerns about the loss of jobs and corresponding impact to the local economy, as well as whether or not they might have to pay more on their electric bills. These areas were noted as topics to include in future communications.

From the stakeholder meeting and the survey, it was determined that Crystal River three could be most effective with a structured, integrated plan. Out of the surveys, there was an overriding theme in this location and from its stakeholders. Duke Energy was less trusted than the local newspaper. That told us, that told Crystal River that part of the plan needed to be targeted press releases and tours to get decommissioning status updates into the trusted locals to communicate to them, and the state of Florida did not pursue any legislation to require a panel,

so a decision was made that, at Crystal River, a panel would not be as efficient as it might be in other places. Next slide, please. I still think we need the next slide.

Community presentations County Commissioners, the Citrus County Council, 2014, a Decommissioning open house, the Rotary Club, 2015, Community Stakeholders Breakfast and plant tour, meetings with newly elected Citrus County commissioners, 2017, federal and state officials, elected official presentation and tour, Citrus County property appraiser and staff presentation and tour, media tours, in 2018, the Florida Department of Environmental protection tour. Written communication examples deal with, um, local stakeholders. E-mail updates to stakeholders, notifying them of important activities, such as submission of the PSDAR report to the NRC.

They have web-based social media, um, outreach, they've got a decommissioning web page, they announce most of their, um, major and not so major events, such as auctioning of Crystal River three's assets. Um, there's a variety of communication and community events that keeps going on. They continue to be active in community giving. They are involved in equity projects throughout the county and the area, and they are dedicated to never forget that your employees are most often your best ambassadors in the community. You need to know how effective your strategy is of engaging with the stakeholders.

Crystal River researched the average attendance at open houses that had been hosted in other plants in their fleet and found that the average attendance was 96 people. A goal was set to promote open houses such that at least over a hundred people would attend at Crystal River. Promotion was done by advertising the open house on decommissioning web page, sending out a local they wanted to receive future updates. Post-effectiveness reviews determined that 150 people attended the first, exceeding the goal of having a hundred individuals participate.

Second objective was to positively influence how people feel about plant workers, the decommissioning plant and Duke Energy's, um, in general, and the goal was that at least 70 percent of the attendees would say that the open house expanded their awareness and caused them to feel more positively, and at least 60 percent of the residents would say they felt more positively about Duke Energy in general. There was an exit interview at the open house, they were, the interviewers were coached on how to, um, in advance as to how to approach attendees and requested that they answer a three-question survey, and the, um, 75 percent said their awareness about decommissioning had been expanded, 71 percent felt more positively about the decommissioning project, and pretty much in line with the success of the goals that they had previously established.

You can see, um, that this is how Duke will check and adjust based on the fuel status that they had go through at Crystal River. They've also reached out to Maine Yankee, because they're an excellent example about how they checked and adjusted the effectiveness of their panel, because, again, Maine Yankee's original community action panel meeting was a sell-out, covered by many, many members of the media, and I think now, we're at the stage where it has

evolved, and they deal mostly with the efforts of Maine Yankee to remove the spent fuel. Last meeting, Bob, the attendance was?

BOB CAPSTICK: I wasn't there, so I don't know.

MICHAEL CALLAHAN: That's right. Eric was there, and it was 20 people at the most current. Um, the charter's purpose at Maine Yankee, you know, was fairly, we are on slide 12 now, was fairly standard, and I think by actively engaging the community and obtaining local citizen views about the decommissioning process, um, we all conclude that and keep the communities informed. Um, but that mission is going to change over the life of that plant, and it's going to change according to the status of the decommissioning effort, and it's going to change according to the status of the spent fuel.

So, um, the point of the final slide and the summary we have, and I think we want to move to the next slide, there's proven industry success to date working with state and local governments and stakeholders, and it demonstrates that the drive to try to ensure from a guidance point of view that there be one size fits all is misplaced. I've just described an experience that's absolutely foreign to these places, but it fits well in Crystal River, and there are other places where it fits well, and Crystal River, in attempting to adjust its outreach program, will draw the lessons of Maine Yankee to see how that presence evolved, and I think the point of making this presentation today about how thorough Crystal River was and how thorough, how their effort was tailored to the local conditions, indicates that all of us need to be careful about how we approach how each plant would effectively fulfill its community outreach initiatives. So, that's the nuts and bolts of Phyllis' presentation.

She can do it far better than I can, because she lives it, she lives it personally, and she's wonderful at it, but again, we don't need to have one size fits all, and at the end of the day, when we're all, when these plants arrive as ISFSI only and it's only the Division of Spent Fuel Management really worried about it, you need to make sure that we've provided, it's going to be in your interest, as well as our interest, to make sure we provided the flexibility to adjust these community engagement panels appropriate to the mission that it needs to fulfill. That's it, and, um, applaud Phyllis for her good work. (Applause.)

MICHAEL CALLAHAN: Next is Jeff Dunlap, who's going to describe, um, the implications of new business models that are emerging. He's the Manager of Decommissioning for Exelon and responsible for the implementation of the decommissioning trust fund NRC reporting cost estimation, cost reimbursement, responsible for experience in the nuclear power industry and has a BA from Augustana College and an MBA from the University of Chicago. Thank you, Jeff, for joining us.

JEFF DUNLAP: Thanks, Mike. It's good to see some familiar faces from my days in spent fuel, although it kind of reminds me that even though my title now is only decommissioning, I can't really get away from the spent fuel issues.

So, I'm going to talk a little bit about how those two are really interconnected and some of the industry trends that we're going through as far as what we're doing with the decommissioning model. Um, I call this a new business model here, but it's really not that new. The first application of this really was at our Zion site, which, now, the license has been transferred to EnergySolutions, as I think most of you know. It's been a pretty successful project. We transitioned in 2010, it is just about complete.

The final, um, surveys are being performed now, and we expect that the license will be terminated down to the stand-alone ISFSI in about another year or so. Um, really, while there's lots of decommissioning, um, lessons learned, of course, that we've gone through, what I think the model really showed at Zion is that we can apply the license transfer model and make it be successful. We're now seeing that in, I think this is now the new part, the Zion model was to have the spent fuel transferred back to Exelon at the end of the project, kind of the newer part now is these are more permanent license transfers that you're seeing, so as the model adapts, I think we're seeing more and more towards that trend.

However, the key point there is that, um, the spent fuel is really what is the limiting factor, and, so, we need to make sure that we are looking at that for the long-term, whether we're getting it back to is really rapidly shifting towards spent fuel in the model. The best thing about this, really, is that, um, it's more of a prompt decommissioning, which is really good for the community, it's good for the plant, it's good for the owners, it's good for the new licensee, and, so, what we want to kind of stress here is that it's really in the best interest of all the stakeholders, and we're hoping that the NRC can see that and help support that model as well.

So, if we go to the next rapid decommissioning, and we're seeing that, Zion has already showed that, there are several other utilities that are now using this, we're doing it with Oyster Creek, Vermont Yankee has done it, Pilgrim is doing it, so we're seeing this in certain areas, that this is the preferred business model. It really does promote new technology and expertise in decommissioning. You're seeing companies that are really focusing on decommissioning, and part of that is because there's more plants that are shutting down, but I think this model can really promote that, because those companies can then see the, um, business advantages of the decommissioning instead of just having a piece of it, having a more, um, encompassing role in the decommissioning itself.

It certainly adds jobs in the local plant area. This really reduces the impact on the local community, for a in 2010, but it was 12 years between when shut-down occurred and when we did that license transfer and started the actual decommissioning, so there was a period in there where the local community was really affected, property taxes went down, and you could really see it, unfortunately, in the community. So, this model kind of has a more soft landing, if you will, it allows a lot more jobs to be maintained in the community, the community can plan for how they, you know, what's going to happen when the decommissioning is done, so it really does help in that area. Um, then, finally, it allows the people at the plant who really know the plant to participate in not just the planning of the decommissioning, but the actual decommissioning. I think that's another really important point, is you don't want to lose the people who understand

the systems that you're taking out, or the history of the plant, the site assessment, and that knowledge is critical to effective planning. We're seeing that right now in Oyster Creek.

We've done a lot of planning upfront, even before the license transfer there, and, you know, to have those people, not just, we have a separate organization just for planning, um, that is now, obviously, after shut-down, transitioned to a more, a full decommissioning organization, um, but those people were just critical in understanding everything we need to do. If you don't have that background knowledge, you're never going to be really effective in planning for that. So, there's think you're going to see a little bit more of that in the future.

So, um, we went through, last thing I wanted to talk about a little bit is the potential for the proposed rulemaking in decommissioning to affect this business model and why we think we want to make sure that whatever is done there supports these stand-alone ISFSIs, where we're going to, and the reason that's important is that the stand-alone ISFSIs, as the end point of this new business model, will help, um, incentivize people to want to use this model and go into early decommissioning. A couple of things I specifically wanted to bring up that are in the proposed rule or in the guidance associated with that rule as it's now drafted, and the first one is requiring certified fuel handlers for the stand-alone ISFSI. Really, there's no fuel movement at these facilities.

The emergency plan requirements don't support the knowledge from, that is needed from a certified fuel handler, there's very little that can actually happen at these plants, or at the stand-alone ISFSIs rather, that I think everybody is aware of, and, really, what has been shown at existing stand-alone ISFSIs, but also in the ones that are coming up, like Zion and others, is that the business model there needs to be flexible enough so that we can most efficiently and safely run these organizations, and to have specific positions necessarily doesn't support that model, and there's really no safety basis for that requirement. The other one is in the radiated fuel management plan, requiring additional, um, systems and structures that, for retrieval of fuel to years, but we've seen, it's monitored very closely, um, the structures are robust, we've seen that the NRC has a detailed inspection plan that will continue to, um, be implemented throughout the lifetime of the stand-alone ISFSIs, but, really, the design of the casks themselves is what really prevents any adverse consequences, so there is no, again, no safety basis, really, for having this additional equipment or systems maintained, it really is just an added cost that does not increase the margin of safety.

Um, and the final point here, really, is these things, while they seem like they, you know, in writing, don't, um, put an additional burden, they really do, and what we are worried about is going to disincentivize people to use this new business model, and in that case, it could actually incentivize people to stay in safe store, meaning keeping the plant there, the best interest of all the stakeholders. So, um, that's really, um, the main motivation here, and anything we can do to, you know, kind of incentivize the safe, or incentivize the new model, I think is in the best interest of everybody. Thank you. (Applause.)

MICHAEL CALLAHAN: Gerry Van Noordennen is going to address future capabilities, and we've seen, um, some of this future capability expressed in the Maine Yankee inspection. We hope that there are additional inspection techniques, and we hope that there are other tools coming over the horizon that further, um, prove the safety case for, um, the stand-alone ISFSI. Gerry currently serves as Vice President of Regulatory Affairs for EnergySolutions. He's responsible and accountable for ensuring the nuclear decommissioning projects comply with and are in conformance with federal, state, local, and environmental, nuclear and environmental regulations, governing nuclear plant decommissioning operations. He's also responsible for coordinating all EnergySolutions actions with the NRC, including spent fuel and LLRW cask licensing.

He has a Bachelor's degree in Nuclear Engineering from the University of Michigan, a Master's degree in Nuclear Engineering from Northwestern University, and a JD from John Marshall Law School. Gerry, thanks for joining us. Appreciate it. (Applause.)

GERRY VAN NOORDENNEN: Well, good morning, everyone. Um, I wanted to just spend a few minutes to just, um, talk about future capabilities for ISFSI long-term storage, and especially in the inspection and maintenance area, but before I do that, I'll move to the, um, next slide.

As Jeff Dunlap, um, mentioned, EnergySolutions is currently the NRC licensee for, um, Zion and Southeast Fast Oxide Reactor down in Arkansas, and we're just about done with that, and we've got, facility in, um, South Carolina, for the state of South Carolina, and we have various other state, um, licensed facilities around the country. We've been doing decommissioning for a long time, as Jeff said, at Zion, we started, um, about eight years ago, and the plant was in safe store, all the fuel was in the pool, and, so, we had to build this, um, this ISFSI, and we've got, um, 65-casks on the pad here, 61 with fuel and 4 with GTCC for both, um, Zion units one and two.

This was the, um, largest spent fuel transfer campaign in the history of the U.S. to date, and it was, um, it was done successfully a few years ago. Um, we're also, we've completed the, um, demolition and decontamination at Zion, and, um, as Jeff said, next year, we're going to, um, in the spring, we'll finish up FSS and final site grading and then turn the license back over to, um, to Exelon by the end of next year, and again, this was the, um, Zion is the largest commercial decommissioning project done successfully in the history of the U.S. to date, so we hope to continue with those, um, records in the future by doing future decommissioning projects. Um, the next slide, just a little background, um, I'll get into, you know, what's evolving in the area of spent fuel, and, you know, we've been managing the Zion spent fuel facility for about six years, since we built it, and we've been running it, and what we did up at La Crosse, and I'll talk about that, um, even though we're the licensee, we hired, um, Dairy Land Public Cooperative, Cheryl Olson and her people to run the ISFSI for us, and that has the extra advantage of, they've already, they were already doing it for a few years, and then when we're done with decommissioning, we'll be able to transfer it back to them, the license, it'll be a seamless transition, and so far, it's worked very well, but, you know, what's evolving in dry cask storage systems?

Obviously, when dry cask first started 20, 25 years ago, we had some spent fuel the inspection methods, what Paul Plante just showed, you know, we've, over the years, cameras have been miniaturized and are now common use throughout many industries, and that will continue, and now, we're seeing robots getting better and better and being miniaturized, and I think that evolution will continue for the, um, spent fuel inspections down the road, and that's a good thing, and we should, um, we should fully support that. I think, um, as these robots get more advanced and smarter and more capable, we'll be able to, you know, make it easier to do these inspections, and, you know, the research we heard about yesterday from the NRC and the national labs shows that long-term storage, you know, is something that's very viable, and I'll just throw out historical perspective.

Um, concrete has been around for almost 2000 years. Best example is the Roman Pantheon, which is still in existence, still standing, it's visited by thousands of people every day, and, um, you know, as long as it's maintained, it's probably going to be there for another few thousand years, and stainless steel has been around for about a hundred years, and, um, to date, unless you pour harsh chemicals on it and induce stress grows in cracking, we haven't seen any long-term degraded effects with stainless steel. Of course, that's only a hundred years, it's not 2000 years, like concrete, so we've got a few more hundred years to go before we see any real long-term effects, and all this indicates that the spent fuel and greater than class C waste, the storage systems are as robust, if not more so than what we, um, first inspected, expected.

I mean, we have, um, these systems were originally licensed for 20 years, and we're going now to 60, and we think the design life of these systems are easily into, you know, one or 200 years, depending on the various designs of the manufacturers. So, as long as we do and continue to maintain the just almost commonsense type of maintenance on these, um, systems, um, and that would be repairing any cracks that form in the concrete, um, repairing, repainting any surfaces where the coatings have been scraped off and changing the seals, as Paul talked about on the lids, anything that's exposed to the weather in surface, something like that, important. As long as we maintain that, we expect to see these systems last for a long, long time.

One thing, maybe we should also bring up, and I've seen that at a few of the ISFSIs, is, um, sometimes, the pads, when they're poured, they're supposed to have a slight little curvature on them so that the water doesn't pond when it rains or the snow melts, and if you get that ponding, and maybe it's only a half inch, or at most, an inch of water on there, if that stays and basically seeps underneath and comes in contact with metal surfaces for a long time, obviously, those few facilities that have that ponding. It would be easy to put a little, um, trench or channel in the ISFSI pad, to have the water drain away and not stay in there.

That's, um, maybe corrosion that might occur, not from stainless steel, but from any carbon steel components that are there. What's the challenge before us? We should take advantage of, um, you know, the benefits that we've seen in technology and the, um, efficiencies that we've developed for inspections, for example, NUREG-2214, it's a good roadmap for doing maps and

following aging management. It seems to be working well so far. Time will tell if we need to tweak it.

I'm sure we do, like we do everything else in this industry, and we can continue to, um, improve on the inspection capabilities as technology improves, but we have to be careful there, that if, um, you know, a national lab comes up with a million dollar machine that supposedly has some new technology that's even better, well, that shouldn't be forced on, you know, the ISFSIs, just if on what we've seen so far. So, you know, as long as we stick with reasonable advances and improvements that we see, I think, um, that would be fine, and again, following the research and successful, factor in what our experienced database and research is telling us.

So, that's my message for today, and I think my final slide is the Lacrosse ISFSI, and you can see there's only a few canisters there, but, um, we treat it just the same, whether it's got one canister or 65, How does this all hang together? What are we trying to show you that's just over the horizon?

Decommissioning mission to the issue of how are you going to manage the spent fuel. It consumes the most controversial of the, um, shut-down site, of the recently shutdown sites, once they know that a reasonable decommissioning process is underway, and what that means is this division is going to one day inherit, um, ISFSI-only sites that are engaged in the long-term storage of spent fuel, therefore you have a vested interest, and we all, as stakeholders, have a vested interest, and this is the point of the DPC and our interactions with the NRC and with other stakeholders, that in that journey from immediate shut-down to when we are a Maine Yankee or Dairy Land or SMUD or any of the other two Yankees or Trojan, etc., that we haven't created two or more classes of sites for us, for our companies to be the licensees for, for you all to be the regulators of.

Involved in that is there's a, there are, yesterday, with Paul, with others, establishing a record of safety that goes beyond what we might have imagined 20 years ago, or what many might have imagined 20 years ago, that each time we suppose that there's an issue, that each time that we look at an issue to be investigated, the results seem to be coming out that not only is the storage mission going very safely, it's exceeding our expectations, that the issues with respect to aging, that the issues with respect to performance of the fuel are coming off better than we once imagined, therefore we need a look over the horizon here to make sure that the actions that the NRC deals with and that the, that this division deals with are based on safety and security and not simply on compliance, or that we look at the compliance-based requirements and see how, continue to see how we may extricate ourselves from an emphasis on compliance. We note that the Commission meeting recently on transformation by-passed, and perhaps because of time and unintentionally, by-passed spent fuel managements.

Only Commissioner Baran had a question related to it. We want to continue to work actively with you to engage on basing our programs, your regulations, and the guidance on matters that have safety, security, and efficiency impacts and take advantage of the significantly reduced risks that we recognize and are continuing to emerge.

Go back to some of the examples that we raised in the decommissioning rule. What in the world do the radiated fuel management plan was one, but, again, you all are going to harvest the results, you're going to be left with the results. The Decommissioning Plant Coalition has urged for many of our misses that the role of NMSS needs to be strengthened in the decommissioning rulemaking process, and I think, my personal opinion is the Division of Spent Fuel Management ought to be a primary driver, a primary voice in what emerges from the final rule. There needs to be a clear authority about looking at all the provisions of that rulemaking from the point of view of shutdown ISFSI. After all, this rulemaking has at its base the status of the spent fuel as it moves along the process. So, you all, we all in this room have a great interest in how that turns out.

From our perspective, our interest is how it turns out once we're all ISFSI only, and we hope you will accept and work with us in acknowledging the safety record and ensuring that when we think of new requirements or new guidance, that we keep uppermost in the mind that we need to keep safety, the safety and secure storage and the success we've had so far uppermost in mind.

DANIEL MUSIATTI: We've got somebody rushing to the microphone already.

SPEAKER: He promised he would.

SPEAKER: Mike, if you could, um, reflect back on the transformation commission meeting, and if you had been at the table for that, could you, um, give me a nugget of what you would have wanted to tell the commission on what transformation, um, the agency should undertake in the area of the, um, decommissioning plant coalition from your perspective?

MIKE CALLAHAN: I think from our perspective, we would have hoped that there would have been an examination and we'd be, you know, we're always glad to help examine those, and not just from the DPC, but all your stakeholders, the current licensees, the current applicant licensees, looking through issues that we see as, um, as regulatory regime less dependent upon compliance as we envisioned it when they were first setup to now taking advantage of the safety record. Let's take, for example, the requirements, I'll just pick one off the top of my head. It may be good, it may be bad.

Let's take, um, 72.212. Given the fact that we've now done this, that the vendors have constructed, um, canisters and casks for many years now, and licensees have stored them in those casks, do we need as extensive a requirements under 72.212 as oftentimes we're led to believe, or that we engage with, or our and we've touched upon them in different rulemakings, etc. I suppose that you all have engaged in some transformation efforts, but to the DPC, at this point, they don't seem to resonate, and they don't seem to have been populated with us as to what your intentions are with respect to that, and we'd like to engage with you and help you with those efforts to the extent that the transformation process continues to be, um, to be an agency program.

Gentlemen, any other issues today about what are we going to do about a problem canister or cask, and we immediately rush to the point that there's a failure that requires a full mobilization of this agency and the licensee into a licensee's corrective action program with respect to a canister or a cask. Gerry just alluded to perhaps there is some cracks that need to be addressed. So, we need to be sure that we develop, um, viewpoints, guidance, regulations on what you really mean by, when you ask us what are you going to do with a failed cask, there needs to be a bit more precision in that question, etc. The fact that there are lots of reactor issues, I'm sorry, canister or, um, cask issues that are going to be relatively easy to address. The ones that we tend to address in meetings like this are the ones that are beyond design basis and just don't seem to be credible accidents. I have a question.

A few years ago, we saw a chart from the NRC that gave the results of the EPRI study in your own work on, um, on overall risk of dry cask storage, that at the time were correctly called by your staff not having achieved the duration of operating experience to be statistically significant, but it looked at safety numbers of dry cask storage that, for BWRs, 10 to the minus 12, and PWRs, 10 to the minus 13, at what point do we have to get to an operating experience to begin to address those sorts of numbers so we can begin to view our regulatory mission and your licensing mission through that prism? And is there any effort going on to update that? That would be something I'd just appreciate a follow-up on later on perhaps.

JOHN MCKIRGAN: We can follow-up with you on that. I think those risk studies have been done, I think as we continue to look at them, we continue to affirm the results. I think all risk studies need to be, um, considered very carefully. I think you all acknowledge that it is a hazardous material that you're managing, and it's important that you continue to manage it well. Um, risk studies have a number of very important assumptions, and they all need to be looked at very carefully before making generalizations. Those were two very valuable risk studies that we continued to glean insights from, but one of the fundamental factors in those risk studies is the regulatory framework and the safety framework and the safety culture that exists that achieves those low-risk numbers, and the key for us, and I think the key for you is to maintain those features, those cultures, um, and to not compromise the framework that we have such that we jeopardize that risk, and, so, um, I will, um, we do continue to do that, and you actually heard me ask yesterday of the vendor panel about their views on risk, and so it is certainly an important topic, and I can commit to follow-up with you later on what further studies we want today do there.

CARLYN GREENE: I've asked a couple people this, um, over the conference, but I'm just wondering the panel's, um, impression. The new business models are really just in the U.S. Do you all see this expanding to other countries, like the UK or Japan, with all the reactors that are being shut down there?

GERRY VAN NOORDENNEN: EnergySolutions, we've been working, um, with the Japanese for the last few years. We've also, um, we're also helping tsurget ready to decommission, and, um, I don't see those types of models being used over there, where a private company would, um,

would take over, I think it's more, um, tied with the utilities, and there's a stronger, um, federal government connection there, so I don't see those types of models happening. Even the license transfer model that we used at Zion and Lacrosse, I think it's going to be more, um, decommissioning contractor type thing, working with the utilities is, um, plants will be decommissioned over there.

DANIEL MUSIATTI: Are there any other questions from the floor here? Okay, one more.

SPEAKER: A couple of comments and a quick question, so I'll try and be brief. So, there were some comments and questions about, um, inspections, I think it was great hearing the presentations from Maine Yankee on what you guys have been doing and using some of the tools that have been developed, and measurements, and part of that was to feed into the inspections and robotics that were developed to deploy, and cheaper, to the point where they're almost to a disposable, throw-away kind of cost, and we'd also talked about some mitigation potential.

Certainly, we're working and looking at that. We've shown in the lab that that is feasible, maybe not ready for primetime yet. So, the question that I have for the panel is based on what you've shown today, what you've heard today, what are some of the technologies that don't exist right now that are needed or necessary or useful for future ISFSI operations and keeping things going in a safe manner?

SPEAKER: I guess that's a technical question. Personally, I feel like a well-prepared technique is the kind of thing I'd like to have in my toolbox as a utility. It's not a technology we haven't used all over nuclear plants and very difficult environments. I don't really see why that would be, um, difficult to implement here. Problems are going to be with licensing and qualification, and those take effort and money, and usually, a need drives somebody to want to spend that kind of money qualifying and developing a process like that, and as an industry, we haven't identified a need yet. So, you know, those are the obstacles to bringing it, is our research group for a lot of the activities and utilities we want to sponsor, so, you know, it's in the right place right now, and we're moving, maybe not as fast as some of us would like, but we're moving in the right direction, I think.

DANIEL MUSIATTI: Okay, I think I'm going to go to the phones. Is there anybody on the phone that has a question or a comment?

PHONE OPERATOR: Yes. Donna Gilmore.

DANIEL MUSIATTI: Hi Donna.

DONNA GILMORE: I take issue with us calling the canisters robust, and EnergySolutions said that the, you know, the welded design is better than the bolted lid. I want to ask EnergySolutions, um, what's your plan for determining the condition of the aluminum fuel

gaskets and the condition of the hyper and dry storage, if you can't even inspect inside with the welded canisters.

GERRY VAN NOORDENNEN: We're not involved with the spent fuel transfer campaign, we're basically on hold, waiting for the, um, state environmental permits to be issued sometime next year before we can start decommissioning, so.

DONNA GILMORE: This isn't about San Onofre. You made a general statement that those canisters are better, so it's regarding your power point statement.

GERRY VAN NOORDENNEN: Yeah, I didn't, um, I didn't say they were better, I said that new technology, I said the, um, and the older canisters with gaskets, I think are just as good as the weld ones. Just advances in, um, technology from the cask vendors, and, you know, as long as the, um, gaskets aren't exposed to the weather and go through the annual freezing and heating and cooling cycles, I don't see where you're going to get the degradation.

DONNA GILMORE: Well -- inaudible -- either the Japanese or the German model, but you still haven't addressed how you're going to be able to inspect inside the canisters. When the canisters were opened, they saw the aluminum gaskets were not going to hold up more than 60 years, so now we've got close to 3,000 canisters in use, and no one has any idea.

DANIEL MUSIATTI: Unless there's a rebuttal or further comment from the panel here, I think we'll move on and take another question from the audience here. Donna, you do know that, um, as always, you can, um, you can contact the NRC after this meeting and ask these questions or send in comments through the NRC.gov link to this conference. So, anybody in the room? Operator, do we have anybody else online?

PHONE OPERATOR: Yes, we do.

SPEAKER: Hi. Thank you. Yesterday, you referred to the cradle to the grave analysis of the spent fuel, and I think that at San Onofre, which I'm a local resident, we're far from the grave, and we're very, it looks like there's a long life for this fuel, and I'm wondering, um, how the industry and the NRC coordinates their evaluation to make sure that there's contingency plans in place now rather than down the road.

Since the loading began less than a year ago for defective shims, canisters have been loaded, and we found out at that time that Edison does not have the ability to retrieve the fuel to put it back into the pool, and then I found out that, um, that none of the 3,000 canisters have ever been, um, opened, so I'm wondering how you can run an industry without having that kind of information. We've also had the, um, the near-miss incident, where we now know that there was metal to metal contact, the would seem like it would, um, there would be mechanically-induced corrosion and cracking, yet Edison stated that the metal would self-heal, yet we haven't seen any technical documents stating that that is possible.

So, my comment, rather than a question, is perhaps the NRC and the industry and the community should open communication, and since the, um, San Onofre is now on the spotlight, in the spotlight, on the home page of the NRC web page, I think all these people are doing studies, spending millions of dollars on studies, they should apply it in real life situations at San Onofre and look at the, I don't know cradle to grave, but cradle to mid-life, at this point, the whole design isn't even valid for 20 years. We don't have any way to inspect those canisters for corrosion, which are actually getting damaged in the process of loading -- buffering -- this is a serious problem, yet they can't replace the canisters. There seem to be so many egregious problems -- buffering --

DANIEL MUSIATTI: Okay, thank you for that comment. Operator, is there anybody else on the phone line that would like to speak?

PHONE OPERATOR: Yes, we have a couple more.

SPEAKER: Hi. I had a chance to speak to you yesterday, and I just wanted to follow-up on, um, some of the concerns you just heard about what's happening in our community at San Onofre and push back a little bit on what I heard earlier about, you know, not having to be prepared for unrealistic, you know, possibilities on canister issues. They really are highlighted by the recent near miss at San Onofre. So, I'm going to take just a little time to reiterate the idea, suggestion, or plea or whatever you want to call it from yesterday and solve a lot of problems for our community really quickly by taking one of the defective Holtec canisters with the bad shims, load it with water, and instead of fuel, with lead, with zirconium, lower that false kind of test tank into the silo, bring it back out, measure the scraping that took place on it, move it over to a pad where you can drop it 18 feet and take all the measurements and see if, um, that canister is damaged or not, even if it's lighter than what the real load would be. I think we're doing it not just for San Onofre, but for the thousands of canisters that might be loaded in the future that might drop in some unexpected way, the way it almost happened here, and your solution's not good enough. So, please, do that test for us .

SPEAKER: Thank you for that suggestion. Does anybody in the room have a question or a comment?

SPEAKER: I had a question.

SPEAKER: Thank you.

SPEAKER: Um, I made a note much earlier in this briefing, how many here have been to one of the true ISFSI-only sites? That's a pretty good number. That's good, because, um, it's a very interesting trip, to go to a site where the only thing that's there are the spent fuel canisters and casks. It made an incredible impression on members of the Blue Ribbon Commission that visited Maine Yankee several years ago, and it, um, it really is a, um, it really is an experience, to go see, the fact that it's there, and there's, it just says to us that, well, it begs for a solution to move forward to removing these from these sites, why are these still here in Sacramento or on

the banks of the Mississippi, etc. It really does beg the question, when you look, why these are here. So, I just wanted to ask curiously, and that was a little, maybe just a bit more than half, so I'm glad that many have had a chance to go.

DANIEL MUSIATTI: Okay. That was interesting information. Um, there doesn't appear to be anybody that wants to make a comment or ask a question here in the room. Is there anybody else on the phone line?

PHONE OPERATOR: Yes. Jeff, your line is open.

JEFF STEINMETZ: Hi. I'd appreciate it if someone could answer Donna Gilmore's question concerning the baskets. They were inspected, we have 3,000 baskets and I would appreciate it if somebody in the room would step up and answer the question regarding the baskets.

SPEAKER: Okay. I appreciate the comment. The question, um, this is probably a more complicated question that could be answered off the cuff.

JEFF STEINMETZ: Are there no technical people in the room?

DANIEL MUSIATTI: Yes, sir, there are technical people in the room, but these --

JEFF STEINMETZ: Then it shouldn't be that complicated.

JEFF STEINMETZ: What should be done is we should not be interrupting people when we are talking.

DANIEL MUSIATTI: Strike one.

JEFF STEINMETZ: What should be done is questions should be answered.

DANIEL MUSIATTI: Strike two. This is the kind of a question that's going to need a little bit more research to be able to answer it correctly.

JEFF STEINMETZ: You've got 3,000 --

DANIEL MUSIATTI: Strike three. Operator, would you please shut this person's microphone off? Thank you. Does anybody else have a comment on the telephone or in the room? One more here.

DARRELL DUNN: This is Darrell from the NRC. So, with respect to the basket, we evaluate baskets for all spent fuel storage designs based on the temperatures, the loads, and the environments that they're going to be used in, and they have to conform to, um, demonstrate that they're going to be safe under normal, off normal, and accident conditions over the range of temperatures and environments that they're going to see, and we, so we look at the, you know,

the materials that are used, the environments that they're in, the mechanical properties of those materials as a function of the range of temperatures that they can possibly see, and so that's

DANIEL MUSIATTI: Okay, thank you for that. Are there any other comments from the room? Seeing none, I think I'm going to call this morning session complete and put us on lunch break. Unfortunately, the speaker that'll be coming after lunch is not aware of this strategy, and he probably won't show up until just about the time that he's due to do the speaking here. So, um, you guys, once again, have benefited from a little bit longer break than what had been anticipated, so enjoy your lunch and high cuisine of our cafeteria. Our WiFi that's in the cafeteria, and I'm sure that Haile can put the, um, username and password back up again for you, so you can see it, and I will see you back here at 1:00 o'clock, please.

MIKE LAYTON: In the structure that you saw yesterday and also this morning, where we had panels making presentations, addressing questions that came, um, out of those presentations. When we started planning this, um, this year's REG CON, I wanted to challenge our staff into opening it up more that I wanted that is that we here at the NRC, we do, um, go out and do scoping meetings, we do things in a very structured manner as part of our process, the only time that we really, um, have the ability to listen to members of the public is either before meetings or after meetings, and I think it's very important for us here at the NRC, and also for our friends here in the audience that are with industry or with the labs or with, um, other groups, to get a first-hand understanding of what concerns or what things that, um, folks in the public have regarding the type of work that we do for spent fuel management.

So, for this session, it's going to be a little bit of a free forum. I do have a presenter who I'll introduce momentarily, and he'll provide some discussion, probably about a 20, 25-minute presentation, and then I'm going to turn it back to Dan, and he's going to moderate, um, questions that are coming from either the audience here or what thoughts we have on public engagement, what we're doing well, what we kind of need to do better, and also, from the phone lines on those same types of, um, questions, but also, um, concerns that are brought forward. I do have to caution folks, um, this session is not going to be a stump the chump session, where I have a question, and I want an answer right now. We are not in a position to do that in this venue and in this, um, meeting right now, but that said, the questions that are presented to us are important. I'm very interested in those questions. We are having a transcript of this meeting, and what I will offer is that after this meeting, the questions that we gather from this session and also many other sessions, we here at the NRC will do our best to research a good answer, with all the available information, and provide that for this session. Dan is perfectly capable and quite good at, um, managing us all. He hasn't had to bring out the cattle prod yet, which I'm thankful. (Laughing.)

MIKE LAYTON: But with that, I would like to introduce our speaker, and it's David Victor, he's the professor and co-director for the laboratory of international law and regulation. He's a professor of International Affairs the operation of major energy markets. He's an author of Global Warming Gridlock, which explains why the world has not made much diplomatic

progress in the problem of climate change, where he also is exploring new strategies that would be more, much more effective.

Prior to joining UC San Diego, Dr. Victor served as Director of the Program of Energy and Sustainable Development at Stanford University, where he was a professor at Stanford Law School and taught energy and environmental law. Earlier in his career, he also directed the Science and Technology Systems Analysis. His research interest around energy policy, the future role of natural gas, electric power market reform, and rural energy development, um, also genetically modified plants, um, related to trade policies, environmental, or, sorry, climate change policy, and the role of technology innovation and competition in development. He's also the chairman of the community engagement panel for, um, the San Onofre decommissioning, and with that, I'll give you Dr. David Victor.

DAVID VICTOR: For my day job, I worry about the future of the climate, and by chance, um, most of the geophysicists in the United States are here in Washington this week for the meeting, so if you see a lot of people walking around with slide rules in downtown Washington, that's why, and I was really pleased, I'm here for that, and I was really pleased that this event was going on and I could join you today.

Um, I was a little puzzled, frankly, by the agenda, because I, um, am listed as chairman of this session, and I thought, well, that's very nice of the Nuclear Regulatory Commission, to make me the general of this Army of people that they were going to have here to talk about community engagement, and then I looked and discovered that I was both the general and the people.

Onofre plant.

Um, I chair the panel, the community engagement panel, this is a group of volunteers, um, four or five years ago, the CEO of Edison called up and asked me, he'd seen me do some similar work, where you had people from different points of view struggling with technical panel. I said, you know, sure, how hard can this be, because, um, you know, no matter what your views are about whether the planet should be closed, um, the people who seem to be most vocal and were opposed got what they wanted, so I'm sure everybody is going to be rolling in the same for the rest of the industry, because this is the largest plant to be decommissioned and the plant that is most proximate to populations, and, so, what we're learning at San Onofre may be a particularly acute version of what I think we're going to be seeing more and more across the industry as, um, more plants are decommissioned, and we certainly have our eyes on what can we do at San Onofre first and foremost for the communities affected by the plant, but then also, what can be learned from this experience to help improve the decommissioning process for the industry. So, I want to say a few things. I don't actually have any control, do I? Okay. That's a condition I am used to, having no control. (Laughing.)

DR. VICTOR: So, we're a group of 18 members, quarterly meetings. I think a lot of you are familiar with the experience, a few of you came up to me as I was walking in, saying that you've seen many, and one person said they've seen all, to my astonishment, of our shows online. We

have a very vast following all around the world, meetings and so on. Um, each meeting has a theme, and usually some kind of more technical presentation, and then some public discussion and back and forth and so on.

A couple points I want to draw out of this. Um, one is it's a group of volunteers, two is that we have a leadership. The panel was setup on a voluntary basis by Edison, but it knew it had to be serious about community engagement, so there's a leadership that shapes the agenda and the work of the panel. There are some other panels taking shape right now that would not have such a leadership. I think that's a problem. Most of the panel is elected officials. I think it's vitally important. I am a political scientist by training, although most of my Ph.D is from MIT, and most of my research is in highly technical topics. I have learned a lot about politics through this process, and in particular, local politics. You know, if you've ever wondered whether the American democracy is alive and well, come to a city council meeting or come to an event like this and watch how people engage with trade-offs, and to me, one of the most important roles the elected officials on our panel have is that they are doing that on a daily basis, and so they have an intuition and a connection to their constituents that just does not exist, um, for the activist members or for the technical members or for the expert community, for that matter, and I watch a lot of the experts get very frustrated, you know, if only we spoke more information, the public would understand what we believe, and then they would just follow us, and that's not true, because there's not a kind of connection to local reality that elected officials provide.

One last thing about what we do, which is it's a two-way conduit, that this is not just about the operator of the plant, Edison, um, telling everybody this is what's going to happen, this is also about the operator learning what the communities care about, and that has changed in a number of ways the way the operator engages in the process, and you got to listen, and you got to build trust. Trust goes up, trust goes down. I would say that we're at a lower point right now, I'll talk more about that in just a second, and that two-way conduit is vital for community engagement. I'm not standing here today saying that I am the public or I'm the community. I happen to be one person who's talking to a lot of different people, so I'll give you some insights as to what I'm hearing in this role. This is an action shot from one of our meetings. Tremendous amount of action going on there. (Laughing.)

DR. VICTOR: Um, there's an update from Edison about timelines, um, expert presentation, Q & A with the members of the community engagement panel, and then a public comment period and question period. Um, we are in the process right now of trying to revamp the way we do public comment, to have more public comment and to have more back and forth, so that we have more comments, more answers on the spot to the extent that that's feasible. It's hard to do, because that's not productive, or not always productive, and so we're trying to figure out the right balance, and for those who have been watching this closely, you will have seen more of that in the last, um, in our last meeting, where we had more time devoted to public comment and more clustering of comments and responses on the spot. We're also in the process of completely revamping the web relationship, more information, more, um, frequently asked questions, so a new website already up that is a little more user-friendly, so that it's easier to get

information about what's going on. That's also a hard thing to do, um, and advice from folks off-line or in other ways would be welcome.

The number one thing I've learned in this process is that a lot of people were surprised to learn, here's a picture of the plant on the left side today, happens to emotive force there, with a picture of the plant, um, in the late 2020s, when the, um, facility has been completely removed but for the ISFSI. A lot of people have been surprised in this process to learn that when the deal changes and the plant is no longer there and the plant is for granted, but this is actually a very, very important point. This has now become the centerpiece of political attention. This plant, I believe, is a centerpiece of one of the progress, and I'll talk about that in just a moment.

I put on this slide here a selective list of the kinds of things that the public has been concerned about as revealed through public comment in a variety of forms. Removal of spent fuel, I think is number one on that list, and that relates to a lot of other topics. There's been a lot of attention to the integrity of the canisters, corrosion risk, seismic risk, sea level rise, terrorist attack, radiation monitoring. I'll talk more about the canisters in just a little bit. There's been a big movement, big may be too strong a word, but a significant movement in the local community to try and press for real-time monitoring of the site. That movement has had an impact, and there's a program now being rolled out in which Edison will provide real-time information to first responders, and the program is being worked out so that that information can be used in a responsible way. I certainly have been very concerned that if there is real-time monitoring of the site, that it's done in a way that we lower the risk Hawaii about the incoming missiles from North Korea, they didn't, don't quote me out of context few months ago, I built one of the beguilingly counters, and my wife was a little bit concerned that there was a box on our kitchen counter that said Geiger counter, and when she opened it up, it was just a bunch of parts, but in any case, it was a fun project to build. There's a community things I've learned in that process is that that information can be misused very easily, and there's been some folks who have taken that information, posted it in raw form on websites without explanation, or worse, worse, explanations that are incorrect, and that's the kind of so that's an example of an area where the two-way conduit has really changed what's going on here.

I want to just publically commend Gene Stone in particular, who's helped kind of manage this process from the community's perspective. There's a lot of other topics here. I do want to emphasize that because of the nature of nuclear power, there's a lot of attention to folks and concerns about risk, which I completely understand, but I want to mention that there are a lot of other dimensions that are really important. Jobs, organized labor, a plant shuts down, it has an enormous economic impact on the community. They have certainly been concerned about making sure that good jobs come back to the community during the decommissioning process, and also, the impact on first responders. Um, when a plant, um, emergency plan zone shrinks, that has a big impact on first responders and their relationship with the plant. We've helped organize some efforts to try and create a little more of a glide path between the operational plant and the plant with a smaller emergency plan and less of a need, frankly, for first responders.

So, these are the kinds of things that we've been talking about in the community engagement panel. Um, a lot of attention, including at least one meeting a year, are now focused on what would be involved with that the aging management, um, program is actually working? This is one of these many areas where the technical community has a lot of confidence in what it's doing and has a very low capacity to speak with the public in English, because not everybody speaks math, in English about what's happening, and to understand and respect why the public might be concerned about terrorist attack on an ISFSI, why they might be concerned about stress corrosion cracking. The industry has a lot of answers for why high-grade stainless steel, um, radically lower the risk of stress corrosion cracking. I have learned a tremendous amount about that along the way.

I don't think I anticipated I would be learning that as part of this volunteer job, but the industry has a lot of confidence around this but has not done a very good job of helping the public understand why it has that confidence. So, the aging management program, or what we're calling defense in depth, how do we know that, um, pre-crack conditions could be identified? How do we know what kinds of interventions might be followed? If it were worst case scenario and a crack were to emerge or something were to happen to one of the canisters, what would be done? There are answers right now for most of these questions, there are technological programs to provide more answers along the way, and I believe one of the most important things we're doing in the panel is to help organize that information, get people to organize that information and put it all, frankly, in plain English. I want to take a couple slides and just talk about where we are.

After the canister employee of one of the contractors, um, stood up and talked about what happened on August 3rd. It has been portrayed in the public that had that not happened, nobody would have known. I don't think that's accurate. The plant operator knew, and they had reported, or they had told the NRC question that that made this more salient, and I think it's really important in a democracy that doing what he did. The event, the technical basis for the event, I think is now widely understood around the canister getting jammed, and then to my astonishment, frankly, um, the processes allowed, um, the operators to lower all the slings, plus the, um, drop restraint, and for an hour, give or take, the canister stood there, um, unsuspended. Unacceptable. Completely unacceptable. The middle of a formal investigation. It is still underway. There will be inspections, um, coming up very soon about the rehearsals of the new canister off-loading process and a lot of coming out. I had asked the NRC to come out to our last EPC meeting a couple weeks ago, and there was some back and forth about that, but I'm glad that Scott was able to come out and talk about what the NRC has been learning in process. It is not fun, to be up there and having people public engagement, it's going to be important to find more ways to do this in-person, in small groups, in larger groups and so on, and that's what we're trying to help happen at San Onofre.

Um, there's some discussions underway about when the fuel off-loading would restart, sometime in first quarter next year. A lot has to happen, a lot has happened, but still not complete in terms like this, that, um, it's very hard to focus on what we know and what we don't know, and it's also very hard in that vacuum for people to fill that vacuum with hyperbole, and,

so, on Friday, Dan Stutton, Jerry Kern, and I wrote a letter to the community engagement panel, um, summarizing what we've heard that happened, the questions that we've heard that have been answered, because there have been fairly wild claims that there was stonewalling by the NRC and Edison, and then what the road ahead looks like. That letter, it's somewhere between war and peace and a haiku, is going to be up at any moment now. We haven't posted in part because we've been waiting for the public version of the oxide re-formation analysis to be available, because there have been some claims about, um, scratching of the canisters, damaging the canisters irreparably, and the technical basis for that is, um, is very important, and so we've been holding the posting of that until that oxide reformation information is available. I think it's going to be posted any moment now.

This is an ongoing process, so there's more technical work to be done, more to be released. We're certainly putting a lot of pressure on Holtec, on Edison, asking the NRC for help, to release more information publically about the underlying technical analysis, including the statistical confidence around that, um, that technical analysis. That's where we are right now. Um, this is an old saw, but an important one, which is everyone's trying to figure out who to trust. Um, when I went into this, I assumed that the local activist community would not trust the operator, the utility, that's kind of assumption one. I've been astonished at the extent to which the, many folks in the activist community also don't trust you, the NRC, and that's an old discussion, but I've learned a lot about that through this process, and I think that's something that's worth debating and discussing, as to where and how the NRC itself can build more trust.

There's a lot of different groups with a lot of different points of view, so I don't think there's a single NGO one goes to for information. I've certainly benefited enormously from the work of UCS in particular. They've been doing particularly helpful work. I also commend Steve Maharris who has helped us stay abreast on what's going on, so there's a lot of expertise out there, but precisely because of that, people don't really know who to trust. It's a hard problem overall. When you look at public confidence and institutions going on, it's going down. This is true for all institutions. Military, up and down. The church, science, my field, um, regulatory agencies, so strong current into which we are now swimming, into which plant operator is swimming, a regulator so I got a long list from the NRC, maybe a little bit longer when they discovered nobody else was on the panel, but I've taken that down into a slightly shorter list, and I want to talk very briefly about it. I think its seven topics. First, what's the pathway to a change in federal law? Um, there have been hopes that this would be done in lame duck. Whenever there's a long list of things that Congress doesn't get done, everyone imagines everything is going to get solved in lame duck. That never happens. It won't get solved. Um, the assumption is that we have to have a change in federal law to make it possible to move spent fuel to interim storage.

This is the most important long-term issue, in my view, the most important long-term issue for the San Onofre plant and other decommissioned plants, assuming that aging management is done properly and all the other defenses are done properly. I believe the interim storage is the place and the way to do it. The assumption has been we can only do that with a change in federal law, and maybe not just this next Congress, but the next year, because after the next

year, we will be in the full swing of another electoral campaign, already are, to some degree, that now is the time to do it.

So, there's a lot of activities and so on happening here. I'd be keen to have a discussion about what, um, how big the deal is needed in order to make that happen. I do think it's very important without a change in law. Could some reliable contracts led by DOE, without a change in federal storage feasible? I've heard both answers to that question, and I think we need a much more, um, rigorous analysis of that. Second, is a permanent repository needed? Um, I think there are political answers to that question, which is that you can't get the votes you need in the House and the Senate without Yucca being part of the deal, and as a political scientist, I believe that Yucca Mountain is a good idea or that it's viable, but I understand the politics in Washington, that you need Yucca to be part of the deal. Yucca has to be part of the discussions over and over and over again, and it's back at the center of it. Frankly, I think it's pretty interesting, to something else comes along. What I care about is getting the deal done so that we can make interim storage feasible, and that even if Yucca moved forward at reasonable time tables, it's hard for me to see that being immediately relevant for places like San Onofre because of the time do.

The third is will consolidated interim storage work? This is one of those areas where the technical answers are pretty straight-forward, political answers are not very straight-forward. I think we need to remember the lesson from Yucca and remember the lesson from the Canadian and Finish experiences, and the core lesson is this industry does not benefit from a monopoly. If there is one place to send it, then all the opposition focuses on that one place. So, the industry has to have a multiplicity of options, and so I think it's great that there are two sides moving forward, I'd like to see even more sites than that, but the more that the industry, the more that the solution to the waste problem is a solution that travels through a single site, through a monopoly, the harder it is going to be to be successful in this area. My read of the politics is that the politics, um, are going to require consent, and that is very important. I think the new switch report is very important in this regard, the Commission, a bunch of other people. That part, I get. I think the politics in New Mexico, um, raise more doubts about that project than six months ago. I think that project is probably in trouble. Not dead, but it's in trouble, whereas the Texas project actually is looking a little bit more viable, and so I would urge those of you who are interested in New Mexico's solution to your problem, get a plan B and get a plan C, and we who want to spend spent fuel want to see as many letters in that alphabet as possible, but I think those in this business also need to see a certain number of letters in that alphabet to make that possible.

The fourth is what does defense in depth look like? I've talked a little bit about this before. My principal concern here is not that there aren't technical system works, how AMP, aging management plan, how that's actually going to be put into practice, and until there are convincing answers there, you're going to see more of the concerns about stress corrosion cracking coming up, more claims about, um, risks that seem to be technically ungrounded, because there aren't yet really places that people can go to get information about this that's in plain English. I would think that if you're in the canister business or you're in the interim storage business or you're running an ISFSI, that you'd have a really big interest in doing a better job

and articulating this in English. We are certainly keen to help on this and understand where the real risks are and real opportunities are.

The fifth is what's the right risk analysis for oversight for fuel off-loading? We had this experience from the August 3rd incident, which is still going on at the San of course plant, and the community is understandably really concerned about this. They don't know what the worst case scenarios are, and in that vacuum, a lot of information has come out that has amplified public concern, not dampened it. One of the things that I think is going to turn out to be important for the long-term is will this emergency plan be shrunk as quickly as it has been? Probably, the answer is yes. Should oversight be more extensive during the fuel off-loading process? Um, my sense is the answer is probably yes, that there's a lot of things that have been assumed to be very low-risk activities, because the plant is no longer operational, where the actual risk profile may be a little bit larger than we originally thought, and certainly, the public perception of the risk profile is larger than we originally thought, and that's something that I think folks need to grapple with.

The sixth and seventh is about worst case outcomes. We've had many members of the community interested in what could really go wrong at an ISFSI-only site, and it's an interesting question. Um, I am persuaded by the argument that in dried helium-packed canisters, you have no emotive force, and therefore, the explosive scenarios are not credible, and I can understand that from the dissenters on that perspective, but in any case, I understand that perspective. I believe that how do we know that they aren't bad. So, we're going to try and have a workshop on this, we are going to have a workshop on this, we're going to try and make some progress on this in the first quarter. We would have had it already by now, I think, except that the canister off-loading workshop on this, probably in the first quarter of 2019 is. To do this successfully, we have to figure out what we can talk about in a non-classified format. In particular, there's going to be a lot of interest in terrorist attack.

There are a lot of reasons to think that these are actually not attractive sites for terrorists and actually not explosive sites for terrorists, but there's got to be some way of talking about that, not just terrorists standing by, but also terrorists with aircraft and so on, there's got to be a way of talking about that in a non-classified format, and we've also got to find a way to focus a worse case outcomes workshop on plausible pathways and responses. You can imagine all kinds of things, you know, Martians land, and they turn the substance into something that's not on the periodic table that seems implausible to me. Now, I'm kind of making a joke of it, but we've got to find some way to layout here are the scenarios of things that people are worried about, here are the scenarios that what the real risks there and what are the mitigation responses there, and what does all that mean for levels of radiation as compared with background levels of radiation. So, doing a workshop being serious about the fact that we have to talk about this in a non-classified format, and being serious about helping people learn a little bit more about radiation.

That's a big lift, and I don't know if we can do it all in one workshop, I don't know if we can do it well. We're going to try. The last thing I'll say is can the decommissioned plants get better organized? There's an organization of the dead plants, there's some other groups, the CEPs of

these plants, they all have different names, the CEPs talk periodically, even in an informal way, there's a growing number of us, and we have a growing common interest in changes in federal law or understanding what can be done without a change in federal law, in helping the industry do a better job, um, learning about the decommissioning process and learning about things like fuel off-loading and doing that more safely. We have a variety of other common interests. It could well be that the consolidation of the decommissioning industry will help that, because there will be fewer players, and they'll have a stronger common interest working here, but this is something I think we need to work on better, because the decommissioning was kind of a boring part of the nuclear industry for a long, long time. It is not boring, it cannot be ignored, and it has actually now become a central part at San Onofre and a growing number of other plants around the country. Let me stop there. (Applause.)

DANIEL MUSSIATTI: Okay, we're at the question and answer period here. We'll start in the room. Does anybody have a question? Comment?

JOHN MCKIRGAN: Dr. Victor, thank you. That was, um, that was a wonderful talk. I really appreciated that, and again, I've watched many of the CEP panel meetings, and, so, um, I appreciate your looking for different ways to engage, um, you to expand, maybe, if you could, a little bit on, um, I have two questions actually, if you'll permit me, the role of the regulator, and then also, how do you find the right folks in the public to engage to start that and get a constructive dialogue? With respect to the role of the and maybe it might have exacerbated some challenges. I wondered if you could expand on that. I'm always conscious about the role of the regulator, and we have an independent function that we need to maintain, and I'm, I was mindful of how Scott's presence at that meeting appeared, and if you I'm going to probably ask a couple questions back.

Very astute questions here. So, I think the role of the regulator is a little bit bigger than the regulator in the kind of classic regulatory function of setting standards, making sure that the operators abide by the standards. I think the regulator has a larger role here to help the public understand why the regulator has confidence in the operational integrity of a system.

So, if I take the fuel off-loading process, what's clear now around the engineering of the ring and a variety of things, um, there's a personality aspect to this, because contractors come and go, personnel comes and go, sub-contractors stay, and then there's a system oversight aspect of this, which is a management function, and, of course, one of the things that this industry has learned is that the management part of this actually is often the biggest explanatory variable in terms of success and failure. I think none of that's visible to the public, and that's understandable, people are busy, but they need confidence, or think, first of all, that's actually a very important function for the regulator, and that goes to my comments about public engagement and NRC's role in particular at our panel meeting. I think it's important to separate the fact that this last panel meeting and the whole off-loading incident created a highly emotive environment, so people were, I got, and somebody gave me a lemon at the last meeting. I didn't take it home, but, you know, I got a lemon as a kind of souvenir for the quality of the canisters. Other people, you know, yelled from the audience about how I was an idiot and other people

were idiots. I mean, that's public discourse in this country right now, but it's a reflection, I believe it's not the right way to engage in public discourse, and I'm actually a little horrified by some of the things people said, but it's a reflection of the highly emotive content and the anxiety about this, and the vacuum that was created with a lack of information, so that vacuum filled all kinds of scenarios, some of which were interesting and plausible, and most of which weren't, but who knows?

So, I think that's just life, and it's in that environment that one has a meeting like this, and you expect it to be raucous, and, so, I think having the NRC there didn't, you know, the delta on raucousness, if that's a kind of really important is that people see the NRC engaging with these questions and listening and then responding, and that may not mean you can have all the responses right then and there, and I know this is kind of an obvious point, but I've heard as many complaints after the last meeting about the NRC not providing clear answers as Edison not providing clear answers, and one of the reasons that Dan, Jerry and I wrote that letter is that we heard a lot of answers, and we heard some other areas where we don't have answers, and so we view it as part of our job as volunteers to help sift through that, but I hope that you guys will be with us along the way to continue to provide information. So, I don't know if I've fully answered your question, but you're back at the microphone, so my guess is the answer might be partially no.

JOHN MCKIRGAN: No, thank you, that was very helpful. I wanted to switch then to kind of the second part of the question, um, because I think part of why you're here, you know, Mike Layton is also trying to find other ways to engage the public constructively, and I think, as I've watched the panel and I've had my own experiences, um, in engaging with the public, it's a diverse group, and there is, um, a segment of the population that I think may not be swayed by the facts, and I think there is a broader segment of the population that would be, and I'm wondering if you've had any success in finding the right, um, group to engage with that can have a civil discourse and have a constructive dialogue.

DR. VICTOR: Yeah, so there's always going to be a range of views, and there's always going to be some folks who are unpersuaded by anything, and sometimes, people who are unpersuaded by anything actually provide a very important function in the democracy. So, um, I work on climate change, and so this is, it's quite interesting to be in the middle of this discussion, because I work in climate change, and, um, we in the scientific community believe, you know, we kind of understand the core here, and there's still people dissenting, and dissenting and being disagreeable is actually the way science works, and, so, on the one hand, it's really irritating, especially when people are disagreeing about things that you know are established facts, where I think some of what's going on around the canisters is of that nature, but some of it is the kind of normal process, so I think, folks have to be more tolerant of a level of disagreement, um, than you might organizations is not like that. The engineering culture is about going and doing stuff, having confidence in what you're doing, and then just going and doing it.

Um, now, to your actual question, first of all, I think it's super important from a distance to try and identify here are the groups that we're going to work with, because you just will not know, and you will have a huge selection of bias, because you'll identify the groups that are most visible and noisy, and those groups are probably the groups that are less interested, actually, in what you have to say, not to say they're not interested. Here's my take on what's happened the last few months as an example. The webinar the NRC did, I thought it was very helpful, because it provided a lot of basic information as to what happened, what was NRC's response and so on, but you can't just do the webinar, you have to also show up and listen and talk to people, which is what happened, and I'm really happy that that occurred.

I think if you're going to identify groups to have smaller meetings with, and this is one of the areas where we want to have our public engagement improved, more smaller meetings in addition to the larger public meetings, that in addition to the organized interest groups that are highly vocal, it would be important to work with other organized groups that have established a track record of caring technically about these issues and trying to get the right answers, so, for example, surf rider foundation, they're fantastic, they've done a very, very good job of getting tooled up on this, and we may agree or disagree in officials. When we have a question about who should we be talking to in the different cities and I could imagine having a series of smaller meetings, where you go meet with some people, including the city manager from a handful of different towns that are affected by this to answer the questions, and I think you'll get from them a little more balanced set of questions, because they're in the business of hearing not just about the San Onofre nuclear plant, but about stray cats and about the highway expansion and all these other things that they're trying to balance on a daily basis.

DANIEL MUSIATTI: Okay. Anybody else in the room?

Okay, there you are.

SPEAKER: Though I'm a geek, that's the reason I'm here. One of my passions is politics, and to me, this reflects the, you as a political scientist understand this more than most, in my mind, this is a reflection of politics today and the mistrust, and you and I might disagree, and we probably do on a lot of things that we could talk about academically. Is there any way to get the leadership, I hate to say it, here in Washington to come to a consensus on any issues, so that it would help resolve some of these issues?

DR. VICTOR: Well, that's a tall order. (Laughing.)

DR. VICTOR: If you can get it down to 240 characters, maybe.

SPEAKER: I just want to follow-up. (Laughing.)

SPEAKER: This is a red state/blue state issue. I mean, this morning, we talked about the fact that they had meetings at, um, in northern Florida, Crystal River, and nobody showed up, and the only people that showed up were the people interested in when are the jobs going away,

and how is this going to affect our tax base. So, this is a complex cultural societal issue, which makes it all the more difficult to deal with.

DR. VICTOR: Yeah. No, this is a larger question that is a very hard one to address, because we're in the middle of a highly politicized environment. Some of my colleagues in the political science world are trying to figure out what actually explains this degree of this. Most are pretty durable answers, which tells me this is not going to change.

So, when I bring all that back to what does this mean for San Onofre, I think we can't expect to get help or guidance from a higher level, higher level in the sense of not a dyas, but a higher level in Washington or Sacramento, but, um, what we could get some help from is actually one of the few areas of meaningful bipartisan, consensus is too strong a word, but growth, which is around changing the waste act. Um, that would, I think, actually have a transformative, that may be too strong a word, but maybe not too much, a transformative effect on the decommissioned plants, because it would give us something to work towards. So, that's not the same thing as everybody having consensus and solving our problems and so on. I don't think that's possible, um, but it would offer a kind of game plan. I was in Diablo Canyon a few weeks ago to meet with their nascent community engagement panel, and it's really striking to me to watch this plant know it's going to go through this experience, and so they know some of the issues they're going to have to spend time on, like what do we do with all that land, because it's a lot of land, interesting questions around that, San Onofre, very little land and owned by the Navy, so they want it back, um, so you can see some of the issues now emerging, but I can see that people are how do we get organized around that politically, what's our Washington presence, how do we walk the halls in Congress and so on, and if we had some change in federal law or some serious game plan that didn't require change in federal law, then that would really re-orient the political energies in some of these plants, so that's not a, I can't answer your bigger question, but I can give you a small answer that I think is better than Epsilon.

DANIEL MUSIATTI: Okay. If I heard you correctly a few minutes ago, you said that, um, we're going to need to get used to a higher level of disagreement in our discourse, and I think on that note, um, I'm going to talk to mainly the people on the telephones, because that's where I'm going to go next for questions. I kind of have a three-strike rule as far as how people should handle themselves in these public situations.

Strike one is that you've gotten a little bit beyond my comfort zone as far as the decorum in the meeting. Strike two is a second warning, strike three, the microphone is shut off. I'm going to allow for this discourse, to see just how comfortable I am with that, and ask for questions from the telephone .

DR. VICTOR: If you expand it too much, then the better sometimes gets hit. That's why you asked me here, is to have these profound insights like that. (Laughing.)

DANIEL MUSIATTI: That's why you're the doctor. (Laughing.)

DANIEL MUSIATTI: Okay, Julie, is there anybody on the phone that would like to speak?

PHONE OPERATOR: Yes. Gary, your line is open.

GARY HEADRICK: Hi. David Victor, um, wanted to commend you on a very difficult job. I know, um, you're riding a line of fire for most of our efforts in the community, and I'm committed to taking the reasonable approach with you, and I think we've learned a lot from each other through this process, but for the benefit of others, trying to do a community engagement panel, I think there's some highlights I want to make. Um, in city councils, there's a period for public comments at the beginning and at the end. I think that would be helpful. We feel like a lot of our time is spent listening to people that are just filling the time that we have, we're not getting down to the serious essence of the problems, but then there's moments where, um, you know, real honest dialogue takes place, and we all learn something from each other, and, um, I wanted to commend you for one thing.

I'm not sure if it was intentional, but back in the March CEP meeting, you asked a very pertinent question of Tom Palmasano when we were dealing with the shim issues, and I think your question was something like, well, why don't we take eight or nine days and re-load those canisters with, the canisters that don't have shim problems, and that's when the public discovered, from Tom's answer, that there really is no contingency plan for re-loading, and that, um, I think at the time, he said it would take two or three years to come up with a plan to respond to re-loading the canisters. So, um, maybe that could be accelerated, but I just think those are probably unintended revelations that the public got through the CEP process, and I appreciate what has been answers to the questions we asked. I'll leave it at that.

DR. VICTOR: Great. Thank you very much. Briefly, I think we need to do better than the public comment period in city council meetings. In the beginning, it's often for non-agenda items, and in the end, for agenda items. I think we might be doing the opposite, or what we tried out last time was something closer to the opposite, which is to have some technical presentations, and I know some people think they're just filling time, and other people think they're stonewalling, um, as someone who sees the drafts of multiple drafts of the slides usually for these technical presentations, I will tell you that the CEP leadership is aggressively helping the presenters, maybe not always successfully, get focused on information that the public actually wants to hear and needs to know, and so I, you know, I appreciate there's a range of views about whether the presentations are filling time or not. It's really important to have those. Then I think what we need to have is a public comment discussion directly on the topic, where there can be more back and forth, and a few years ago, we actually did that, the public would ask a question, there would be a back and forth. What ended up happening was that I ended up in the middle of a ping-pong, a lot of ping-pong, and that's a great we're going to probably move in the direction of having more agenda-specific comments in the beginning so we can get right to the topic of the meeting.

Um, the second point about the off-loading begins and the plant operations are restabilized, we'll have to come back to. Um, I heard Tom say something slightly different, and then since

then, um, I've gone off and done, and some other people have gone off and done a lot of work on this question about whether there actually is, are strategies are re-flooding a canister on-site and opening the canister, and there are strategies for doing that, and we have asked, um, I'm not sure exactly where all this stands, for some summary of what that would look like. Why do we care about that? We care about that in part because if there was some canister loading event and you wanted to open the canister on-site, that would be important to know how to do, and my understanding is, actually, the technical capability already exists.

Most of the industry doesn't think about the question that way, because if you had some damaged canister, you would put it in a transport overpack and then move it to someplace where you could work on the canister not on-site, especially not at a small site, but I've seen answers to all those questions in the technical discussions, I haven't seen it as one of the next topics, to make sure that's articulated, but one of the reasons we care about the answers there is because of what Gary was mentioning about the several canisters that have been loaded with the previous shim design, is would it make sense to re-open those canisters and, um, re-load them with a different shim design. I think the risk analysis will show very clearly the answer is no, because you could have all the shims fail and get, in your jargon, no credit for the heat dissipation caused by the circulation of helium through the, um, through the canister, um, tubes, you can see how much I've learned about your business along the way, um, I actually showed up physically at Holtec's factory to look at all this stuff, as did other members, because it's really, really important.

So, if you don't need that for the cooling, then I think when you do a risk analysis that it will show fairly clearly that the better plan is to leave the canisters loaded as they are, but that needs to be looked at before the entire fuel off-loading campaign is finished, and my guess is that I know what the answer is going to be, but let's not pre-judge that.

DANIEL MUSIATTI: Okay. Anybody in the room? Yes, sir?

SPEAKER: This is probably a public comment, personal comment. One, I did not know you were a web star, you know, I thought, it was a very good presentation, I liked it. I guess a question, you know, we hear a lot about, you know, the discourse and differing opinion, and, yeah, we can have, respectfully communicate and have differing opinions, but in order to move forward, it takes some resolution to that. So, given, I guess the differing opinions, you know, how do we, how do you, um, take a step forward without, um, in trying to, I don't know, address some of the feelings people have and make people more comfortable, and, you know, we talked about the distrust that everybody has, whether it's engineering or companies or regulators, sooner or later, we have to move forward, we can't just sit here forever, and it's going to make some people mad or uncomfortable, but somebody has to make that ruling, and so how does that, how do you see that playing out?

DR. VICTOR: That's a very important comment. Um, first of all, I don't think of myself as a web star. (Laughing.)

DR. VICTOR: I think Stormy Daniels might be a web star. (Laughing.)

DR. VICTOR: Sorry. Like I said, it's after lunch, and people are basically asleep, so now, some people are awake. I think, concerned about paralysis, you know, paralysis by analysis and listening and not doing anything and so on, because at the end of the day, this is all trade-offs, it's all about is it better to fuel off-loading campaign, I think the technical analysis is pretty clear, the best way is in spent storage, and so we shouldn't be sitting around, dithering, when we have the option of moving to spent storage, but that movement has to be done safely and in a way that people have confidence in the process, and that's why San Onofre is in pause and they'll restart when they're ready. So, I think what people are talking about here is not kind of listening to everybody and giving everyone a vote on what happens, it's that there are some aspects of this industry, central aspects of this industry for which the answers are not all technical, and, so, the public needs to understand better what it is that you guys are doing and why, and that's what this two-way conduit you might have expected from an engineering point of view.

Real-time monitoring is different from what the engineers would have done. The, um, more extensive aging management and research programs around, um, stress corrosion cracking and so on, including peening, probably more than what somebody would have suggested, if you look at this just from a straight-up engineering point of view, and this is reflective of larger public concerns, and it's evidence that people are hearing those concerns, and I think that's the standard that a reasonable person has to be held to, and beyond that, I agree with you completely, the industry has to go do what the industry has to do in a safe and reasonable way.

DR. VICTOR: Thank you for that question, and just as a clarification, um, as Mike said at the very beginning, this is a time for personal observations, as well as technical observations. We're really looking for input from everybody, from every angle, so yours was spot-on, as far as the perspective that you asked the question from.

DANIEL MUSIATTI: Um, anybody else in the room? I think I'll go back to, um, the phones. Julie?

PHONE OPERATOR: Thank you. Donna Gilmore, your line is open.

DONNA GILMORE: Hi David.

DR. VICTOR: Hi Donna.

DONNA GILMORE: You didn't like my lemon? (Laughing.)

DR. VICTOR: No, I didn't, but I have a lemon tree, so I felt like I would leave the lemon for somebody else.

DONNA GILMORE: It was actually an organic lemon, you know. Anyway, um, it's a good topic here, and in San Onofre, we have a pretty educated public. We don't deal in feelings as much

as we deal in facts, and when I read Edison's NPR Associates' report, they're experts, and they recommend taking a leaking canister and transporting it to that Idaho National Laboratory, to the test area that was destroyed in 2007, and it doesn't give me confidence in, um, defense in depth or anything else. To resolve this situation, until you have containers that can be inspected, maintained, and monitored inside out, in a manner to present radioactive Indian Point or others, whether it's Mara Lago, we're all at risk, and, I mean, you're asking us to fly a plane, basically, and say, well, we haven't inspected the wings, but we don't think there's any cracks. I mean, that's kind of the analogy that you're having us visit right now.

DR. VICTOR: Great. Thank you. So, we have a history of disagreeing, and I appreciate the sparring that we've had, because it's, um, certainly made me more aware of the technical literature, and comment. Um, I'm going to set aside the questions of the judgment about the competence of NPR and their review, because I think that's something that Edison should talk about and the firm should talk about, but they're a highly reputable firm. I think the larger issue here, which is important to talk about, is about the inspectability of the canisters, because I've heard the claim made that these things can't be inspected inside and out, they can't be monitored inside and out and so on, and I think, first of all, it's very important to separate inside from out, because if you want to inspect inside, then you have to have a device that can be opened, and that introduces other risks, and so when you do the risk analysis around that, it's pretty clear that what you want for long-term storage is something that's welded, and you don't want to be opening the welds and so on.

The bigger issue is inspection of the outside and stress corrosion cracking, and I really appreciate Donna's attention to that, even if we disagree with what the analysis says and what the experience has been and so on. Um, the issue about inspection on the public knows, and you're just treating it as a technical thing, and you need to talk about it openly, that the inspection regime, especially as the, um, first 20-year lifetimes are being extended, not on our canisters yet, but on other canisters, there's a little more inspection, it's mostly visual, because people have confidence that visual inspections can reveal the right amount um, more robotics and so on, and there's actually a lot going on there, so that's an area where the articulation of defense in depth and what the actual capabilities are is going to be very important, and where the industry actually is doing more and inspecting more and has confidence for why it's not inspecting some things, so I think, actually, the analogy here with the aircraft there on a regular basis, being jostled around by turbulence, so there are stresses on the wing spar, I'm a pilot, so I spend a lot of time worrying about this, because if the wings come off, it's a bad day, and, so, we do that actually, all the time, um, and we do that on condition. That's the why the inspection regimes are setup, and that's exactly the math and the strategy here. So, I think that's a very good analogy. Where I disagree is that the analogy is not being applied.

DANIEL MUSIATTI: Thank you for that. Anybody else in the room? Back to the phones.

PHONE OPERATOR: We do have a question.

SPEAKER: Thank you. Um, regarding inspection, as recently as October 11th of this year at an NRC meeting, they were notified that inspection capability of the canisters still does not exist, but, um, my comment basically is Holtec seems to be quite influential in steering the industry and NRC regulatory process, and from everything we've seen at San Onofre, Holtec is basically the poster child of what not to do, and that due to bad engineering, it actually damages the walls of the canister in the loading process. It's an unacceptable and defective system. The problems cannot be remedied with better worker training.

How could they possibly ever be safe to transport? Any systems analysis would determine it's a defective system. We consider it a lemon, and it needs to be recalled. Until the Holtec system is replaced with thick wall casks that can be inspected, repaired, monitored, and replaced, we are unsafe. We need to avoid the impending, but avoidable radiological disaster for southern California and beyond. This is posted at Sanonofresafety.org. If there's no way to determine the length or depth of the gouges and the subsequent cracking, there's no contingency plan or inaudible -- be put in a larger cask. What's the name of that specific cask that the NRC has overheating canister due to shim design? I suggest you look at the recent report. Regarding the near drop incident, if a canister had actually dropped, it's been said that the canister would have been put in a cask and shipped to a facility for possible repackaging of the damaged fuel.

What cask was on the ready? What NRC-approved transport route has been determined? What facility would have received it?

SPEAKER: Thank you for that.

SPEAKER: Meanwhile, the public has not received analysis on the high radiation readings from the 15-year-old canisters. There was 51 of them. Radiation readings at the inlet air vents on September 5th of this year registered 6.06 microsieverts per hour with 2024 counts per minute. Might those canisters already be leaking? What's the radiological source of those readings? The NRC has yet to comment or report on this. Please heed our concerns. Thank you.

DR. VICTOR: Okay, thank you. Um, I guess I'm going to disagree a little more sharply with the last comment. Um, so, I was physically there when the canister readings were made on the AREVA system, and I was one of the guys there with my recently sodded beguilingly, and we have posted extensive information about that visit, and including my letter back to the fellow who organized the visit, because I was concerned that he had misrepresented what the readings really show, and then on top of that, we've had now two posted, both discussed in public meetings. I think it's a complete mischaracterization situation. I'm concerned also about words like impending and inevitable. Impending and inevitable have particular statistical meaning, and although statistically, we understand what that meaning might be, the public also understands what that meaning might be, and so they're getting this message that we're about to have a mushroom cloud in southern California, and I think it is, I'll say it a little more strongly than I was intending to, but I think it's important, I think it was irresponsible to do that.

I can appreciate that there's a range of technical views here, and it's important to have a debate, for example, it's very important that we have a debate informed by canisters, we understand what the oxide reformation is, I'm asking for another round of material on that, let's have a discussion about that, that's an important discussion, but to take the fact that there's a reasonable technical discussion going on there and attach to that words like impending and inevitable is, to me, outrageous and irresponsible, and so I am very, very concerned about that. I would love to have the caller send me some information about the claim that the inspection capability does not exist. I've heard that claim made many times, I don't quite understand what that means, and so I'd love to have that information in writing, so that I can chase it down, because I believe I've chased that down multiple times, and I believe every single more about that. One more thing. The claim has been made that it would be better to have ductile-ironed thick walled canisters, and there's a range of use about what the right strategy is, um, if you could rewrite what the industry is doing from the beginning, but that's not the world we're in.

The world we're in right now is that the entire U.S. industry, including the regulatory system, is organized around an increasingly more advanced system, um, of stainless steel canisters for which Holtec is one supplier, but not the only, and people are building confidence around that, and, so, if southern California were to suddenly decide to get rid of all those and put in something that doesn't, that is not currently licensed anywhere else in the country, how does that make us safer? Because the product doesn't exist, the product isn't licensed, and worse, the product will be part of a system that has no bedfellows, so then we have no allies when we want to go get a change in federal law, and so from my point of view, that would be plausibly the most irresponsible thing to do. I have documented this extensively, other people have documented this extensively, I continue to be amazed that that argument continues to be made. Sorry for a little bit of edge here, but I've heard a lot of that, and I really appreciate the debate, but I think we also have a public responsibility to talk about what we actually know.

SPEAKER: Okay, we have a comment from the room here now.

SPEAKER: You talked earlier about, um, the need to interact with our, um, elected representatives to try to get the House of Representatives delegation from California, bipartisan basis, has been very supportive of both, and that consolidated interim storage has no greater supporter than the senior the political organizations that you cite tries to leverage its senators and nearby House delegation to do the same, and in large measure, they have, but I would be interested to hear what you think more needs to be done .

DR. VICTOR: I don't know if more is the right word, but I think we need to be ready to go at the end of January, beginning of January, to re-introduce the legislation in the House, we need to, in my view, we need to beef that up a little bit more, we need to do a little bit more on the standard contract, have a smarter strategy around which fuel goes first. My guess is all that's going to happen with the Democrats in charge of the House, so I'm not guaranteeing that's going to be the outcome, but I think the probability of that is higher. The problem continues to remain in the Senate, the politics are always hard there, because it's more of a collegial body. I think your interpretation of what the senior senator from California wants is accurate, but that's not been

enough to be able to get a piece of Senate legislation. Frankly, what I want most is some things from the Senate so we can get confidence.

I think we should make sure that it's moving along in the House. That's a rebuttal proposition, but I think it's probably going to happen, and we need to focus more on the Senate and build a concern that so much energy inside the industry was focused on lame duck, which I can completely understand, because you need to get the money through and so on, but now that we're moving beyond that, we've got to be really ready to go in January. I would hope the industry would put this at the absolute top of the list of its legislative needs for the industry.

DANIEL MUSIATTI: Okay, we have 10 more minutes left in this session here. We've really blazed right through it. This has been a personal comment or question, just to get your view. Um, I know you're kind of pushing for a consolidated interim storage, and personally, I think that's a good way to go, but there's a lot out there, right? Do you anticipate that that will continue once it is out of San Onofre? Because then, it goes to wherever these consolidated interim storages are, and then does it sit there forever? Because it is still interim storage, not disposal or re-processing.

DR. VICTOR: Yes. I mean, look, this is not news to the industry, the industry travels with lots of political bedfellows, and where people are organized, they're going to be focused on that, so this is, for example, why I think the New Mexico site is, the politics there just got a lot harder, and it's because of this, and this is one of these areas where this is completely a political issue and not a technical issue, which is not to excuse it or advance it, it's to say that's reality. My guess is that we're going to end up citing interim storage in places where people are comfortable with those kinds of industrial facilities, and, yes, it will continue.

SPEAKER: I guess the question is more once you are sited there, will there --

SPEAKER: Will people in San Onofre continue to be active on this?

SPEAKER: Well, the public at large still continue to push for continued progress.

DR. VICTOR: So, yeah, I mean, I can completely appreciate the concern, that once the places that are politically very active get their spent fuel moved, that their interest level probably is going to go down. My guess is there are folks that I'm going to disagree with until I die who are going to be disagreeing with me on this, but that community is going to be very small, once the site is truly, um, turned back, fully turned back to the city. There needs to be some more credible connection between interim storage and efforts, if it's not Yucca, then the son of Yucca or deep borehole or something like that, so that these communities that are providing consent don't find that interim now means permanent.

DANIEL MUSIATTI: Okay. As a facilitator, I'm not supposed to do this, but I'm going to take off my hat for a second and ask you a question. I've been noodling around for many years on risk perception issues and working with communities on that sort of thing. Um, we talk about risk

from the technical standpoint as 10 to the minus 6, 10 to the minus 9th, and we compare that to the cost of trying to mitigate that sort of a risk. For the general public, the risk is one that it's not if something happens, but their perception is that it's already happened, now what are we going to do about it, that's the attitude we're supposed to take. Could you rift for a minute on how that plays out with what you're doing with the San Onofre Committee?

DR. VICTOR: Yeah. I think that's the logic behind doing something on extreme events, which is if the worst happens, how bad is it. I've seen from the industry lots of analysis that says, because there's no emotive force and so on, it's not bad, it's not even a fence line problem, but let's put sunshine on all that and talk about it. That's the logic fundamentally, that the risk perception is one. I will say that we have to be a little, we, in the analytical community, have to be a little careful about our excessive confidence in our knowledge of the actual risk levels.

I've found one of the most important books I've read quite a while ago is by a sociologist called Normal Accidents, and it's about how tightly higher than you'd expect from a reactor safety study analysis because of the interconnections between the different components, and you see that in the downloading incident, where people had confidence in the canister that it would have integrity, and something else happened, and explains how the system as a whole behaved. So, we probably want to think a little more carefully about what the real risk exposure is at sites that are going through decommissioning and not just assume the risk is zero, and certainly, in an environment where trust is low and periodically goes lower because of incidents like this, um, people's perception of risk is even higher, and that's, reality, so we need to deal with it.

DANIEL MUSIATTI: Thanks. Let's go back to the phones for a comment is on the engagement with the public and public trust, and I'm not sure that holding meetings, public meetings, large and small, is enough, and in my thinking, the industry and the NRC needs some demonstrated success stories that the public can see and hear about. For example, interim storage, for example, Yucca mountain, for example, some successful decommissioning projects, for example, some successful R & D projects that are sequential, and I know these decisions are associated with the politicians and the industry more than they are with NRC, but the question I have is this, do you see a role for NRC to influence the politicians and the industry to go in that direction?

DR. VICTOR: Thank you for the question. Thank you. I'm mindful the time is brief here, but, um, first of all, I think there's actually a lot of success stories. First of all, the overall operational record of the U.S. fleet is pretty amazing. This is plausibly the highest reliability operational industry in the country. Now, that doesn't mean people's perception of risk is not what it is, but I think the industry overall, the operational record is actually pretty incredible. Um, there's been a lot of, frankly, the that is passively cooled, no motors, no pumps, um, has high seismic integrity, and you can buy more seismic integrity, if you want it, which is what San Onofre did, and other forms of integrity, that's actually an amazing option for the end of life, that I'd love that option end of life. Um, so, I think there's actually a lot of success stories. I will say two things. One is that whenever you're in an operational situation, especially when you go through something like success stories, they're interested in what's right there. The other thing, I think the caller was

asking should NRC play a bigger role in putting that stuff forward, I'm paraphrasing slightly, and I think the NRC has a swim lane issue that it knows about very well, which is that it needs to be seen as an independent regulator of this industry, and, so, leave it to NEI and delivering the nuclear promise and other activities to go out and tell people about what the industry is doing, and NRC, make sure that you are in a nimble, yet effective way, um, regulating the industry, as any good independent regulator does, and that, I think, is the right swim lane.

SPEAKER: Okay. Well, thank you for that visual image of a swim lane, because that's exactly why the NRC separated it out as a separate agency.

DR. VICTOR: You are not the AEC anymore.

DAN MUSIATTI: Yeah, we're not promoting and regulating at the same time. We have time for one more question. I asked if we should extend this, because it has been one of the longest debates that we've had, and session. You guys are getting really used to those breaks, so I can understand that. I could longer than it's scheduled for, and we're going to end it right now, and we'll be back at, um, a quarter till 3:00.

BOB QUINN: Don't squander your 2 minutes. the, um, Regulatory, Spent Fuel Regulatory Conference, titled Regulatory Improvements, or in this particular session is Regulatory State of the Art. So, we're going to find out what that is, apparently. Our first speaker today is Brian Gutherman. First, I'll introduce myself. I'm Bob Quinn, I work for Westinghouse, so I've been, um, didn't start in spent fuel, started with new plants over 40 years ago, but since the late 80s, I was in the, a little company called New Tech that developed a spent fuel canister system, and the rest, as they say, is history.

I can't keep a job, um, apparently, I keep moving back and forth between the same companies important from. First of all is Brian Gutherman, President of Gutherman Technical Services, a creative name he came up with. (Laughing.)

BOB QUINN: A lot of you know Brian, you've been hearing from him the last two days, but his company provides licensing, engineering training, and consulting support to the nuclear power industry, primarily in spent fuel management, but also on the operating plant side. He's worked in the nuclear power industry for his entire 36-year professional career. I've got you beat by four. Done a variety of engineering management positions, worked for an architect engineering firm. He's been involved with the NEI dry storage cask force since 1998 and been a consultant to the industry for the last 14 years. Please join me in welcoming Brian. (Applause.)

BRIAN GUTHERMAN: Thank you. NEI-12-04, if there's anyone in here who has not heard of this document and doesn't know what it is, I congratulate you for awaking from your coma. NEI-12-04 is the, um, replacement guidance for implementing the 72.48 rule, which you've heard a lot about over the past day and a half, but we're getting toward the end here finally. It's, we're getting close, but today, and we're going to have a little different twist on it. I've spoken about

this topic many times, in many forums. We're going to talk today about how this guidance and its endorsement focuses our first start with where we are right now.

Revision 2 to NEI-12-04 was submitted in September 2018. It responded to a few final questions from the NRC staff so that we could get something in the condition that it could be endorsed with very little, if any, clarification and what we hope to be revised Reg. Guide 3.72 later on this summer, and I would say, um, we really need to implementation and not just endorsement. All the licensees and CoC holders still use the 96-07, Appendix B endorsed guidance, and they will need to upgrade their training programs and processes and procedures to replace that with NEI-12-04, so we need to, John, have a dialogue, I think, between NEI and NRC about implementation timeframes. I don't know where we are on the, and the confidence in the process is related to the amount of information subject to 72.48 change control. Right now, the, um, no matter how good the guidance is, its benefit is only as to be moving that lower axis to the right so we can get out farther on that arrow and get that change scope increased, and that goes to the greater approach project that was discussed in yesterday's sessions, which aims to put more information under licensee or CoC holder change control.

So, the long-term value depends on the NRC having confidence that the industry processes will consistently identify those activities that require prior NRC approval, and as as we move forward, if more and more information is under, um, licensee and CoC holder control. What did NEI-12-04 accomplish? When we developed 96-07, we used it for nearly a decade, and we realized that it wasn't quite as easy as it looked to create our guidance, because of the whole general license process, which is not, um, part of the 50.59 process, and the CoC holder authority for doing 72.48 have their own. Part 50, that authority doesn't exist with any of the suppliers, it all has to come through the licensee, so after nine years, we decided we needed to have our own guidance that was, um, identifies several different things, one of which is the 212 report, which is unique to the general license process, and there's somewhere where the NRC saw some habits, if you will, that were not exactly meeting their expectations with respect to the 212 reports and 72.48, so that, um, that guidance was incorporated into the creation to NEI-12-04.

It also addresses the unique needs of COC holders having 72.48 authority and no history for example, how do general licensees receive, review, and process changes made by, um, a CoC site as a general licensee. Um, it also provides clarity on the issue of cask COCs and associated FSAR. I think when the rule was written, the concept of an updated final safety analysis report was one that hopefully would allow all general licensees to only use that latest FSAR, which would apply to all amendments to the certificates. Now, I'm pretty sure that, um, neither industry nor FRC thought there would be so many amendments to begin with, but we're not there yet. We don't have that FSAR process set down, so there are many different versions of the FSAR that apply for general licensees. So, while we don't conflict with the definition of FSAR in the regulations, we do add some clarifying information in the guidance that says what that means for each of the regulated entities under Part 72. Um, it brings 72.48 guidance into alignment with 50.59 for changes to methods of evaluation. That was our, um, I challenge to get

fixed, and what this does, it's really going to solidify the basis for the licensees and CoC holder training programs for 72.48, because this is what it's founded upon.

So, what did we learn through this journey? We found, at least this is my point of view anyway, the enforcement actions that came in the 2000 to 2010 timeframe resulted in lingering confusion on both NRC and, um, industry's part on the 72.48 rule and its implementation and how the guidance was to be used and what it meant. We found the 50.59 guidance didn't translate really well into the 72.48 guidance, at least not as well as we thought it would. We found that our requests for endorsement could have been better, and what do I mean by that? I looked at the submittal letter from back in 2012, and it really was not clear on what we were asking of the NRC at the time. So, absent that clarity, the NRC began reviewing NEI-12-04 from the very beginning, every letter, every word, every sentence. That wasn't our intention, our intention was to have the changes, which we had thought to be, um, improvements in clarity, additional guidance where it was necessary approved, but we never meant to open up the approved understanding of the rule and the guidance, and what I mean by that is nobody in industry has got a level of intention here to violate 72.48, everybody that I know is very safety-focused, they mean well, but there was still not that level of clarity in the guidance that guided the CoC holders and the licensees to the right end point with the process. With NEI-12-04 being endorsed, where do we go from here? What are the expectations of industry? We'll start with those. Industry needs to understand that the need, appropriateness, and technical quality of changes is assured before the 72.48 process, and what that means is the design control process the right thing to do, whether it complies with the regulations, codes, and standards, all of that's on the design control side.

Now, some of that information does bare on what you conclude in the 72.48 review, however, you better have everything buttoned up on the design control side or the procedure change side, whatever the process may be, before you move into the 72.48. Now, that may seem like a no-brainer, but there are a variety of different training and qualification programs out there in industry, some of which don't even include re-qualification, so I would encourage all the licensees and CoC holders to have an initial training program and then a re-qual requirement, if for no other reason than to review the OE on 72.48 that has happened in that past interim timeframe since your last re-qualify.

Ensure the 72.48. We have gone through great pains and spent great resources getting the words in this guidance to say what they say. Please read it, please use it every time you write a 72.48 review. I think you'll be glad you did when an inspector comes around and she looks at what you've done there. Frequently and critically review your 72.48 training and implementation programs. Invite criticism from the outside, especially if you're a CoC holder. Bring your users in, your general licensee users in to look at your program, not just the procedure that says here's what we do, look at the outcomes of using those procedures, look at the actual 72.48 reviews for the changes that are being made, invite that criticism. Embrace conservative decision-making and questioning attitude. I know those sound like trite terms, but they're very important terms, and they usually come through with, um, in the independent review process, same level

of critical decision-making and questioning attitude, and licensees, perform your oversight function with your CoC holders.

What's expected of the NRC? Consistency among regions, we've mentioned this before. I think industry still sees differences among the regions when they get inspected on issues. Risk-informed decision-making, the guidance and the rule, I think the guidance is the right place to apply the risk informant. Continue to apply or increase the 72.48 knowledge in the regions to improve the inspection process efficiency, and hold industry accountable for the integrity of the process, and make sure it's the right entity. Is it the CoC holder, or is it the licensee?

What does success look like? Well, industry will hopefully better understand the 72.48 rule and the guidance evidenced by making fewer mistakes. NRC will increase their confidence in the 72.48 implementation by allowing more information to be under CoC holder or licensee control. That's going to be our metric there, and ultimately, there will be fewer 72.48 enforcement accidents. Now, this modification, is this a 72.48 problem? What's the answer? Hell, no. (Laughing.)

BRIAN GUTHERMAN: This is bad design, it should never get to the 72.48 process, right? Although it's kind of clever. You don't need one of those adapters, I guess, if you travel with that. So, the bottom line here, 72.48 intends for the NRC to review changes, having a nexus to the original safety basis with a focus on public health and safety. It is written as a very high bar for NRC to review your changes. Updating the 72.48 implementation guidance was necessary, but not sufficient for long-lasting regulatory process improvement. One of the keys, but it's not everything, because we need to work with the other efforts that are going on to improve the processes, and right-sizing the information and the licensees and the CoCs will put change control authority where it belongs and better focus resources on both industry and NRC on safety. Always, always, always remember, industry is responsible for safety. We cannot let ourselves be inspected into having a safe program. That's on us. Thank you. (Applause.)

BOB QUINN: Thank you, Brian. Our next speaker is Dr. Jeremy Renshaw. Jeremy is the Program Manager for Used Fuel and High Level Waste Group. He manages the R&D efforts focused on all aspects of back end, including wet and dry storage, transportation, and eventual dispositioning of the fuel. These activities include aging management programs, um, dry cask inspection development, um, maintaining criticality margins for wet and dry storage, understanding, um, high burnup cladding performance, and interim and final storage options. He holds a Bachelor of Science degree in Mechanical Engineering, a Master's in Systems Engineering, and a Ph.D in Material Science and Engineering. (Applause.)

JEREMY RENSHAW: So, this year, I'm here on behalf of AI Csontos, so I apologize that AI is not here. He's at another conference this week, so you get the next best thing, I hope. Maybe you can call me the B or the C team, whichever one you feel is most appropriate, but we're going to have a little bit of fun, maybe not as much fun as last year, I don't have any lasers or robots to show this year. So, the goal of this project is really to understand better what the actual temperatures in dry storage are, and you see a quote here, one of my favorites, that in

theory, there is no difference between theory and practice; assumptions and then taking whatever the model spits out and calling that the gospel truth.

So, what we're trying to do is use the data that we're gathering from the high burnup demonstration project that is being led, I will defer all comments to Keith, who is leading that, but in the interim, we're trying to glean as much value out of that project as we can today versus ten years from now, or nine years from now, when the cask is opened. So, a little bit of the background, where did this project come from? You heard yesterday, when they the right impetus to go into these models, originally, we were concerned that we might be getting two very high temperatures in dry storage, so we wanted to have the high burnup demo to understand what were the real temperatures, what was happening to the fuel, how does it behave in dry storage, and what is the actual environment during that storage period.

Well, as they began to sharpen their pencil more and more, with more accurate assumptions, they found, hey, our thermal models are showing we're only getting up around 270°C for a peak cladding temperature, is a long ways away from the 400° limit, so there was a lot of talk originally about should we cancel this program and scrap it and do something else. After understanding what is really happening in these dry storage canisters and improving these models, and we have a histogram here of the different percentages of the fuel cladding at different temperatures, and if you look at the very high end on the right side, you see a very we talk about the peak cladding temperature, it's very important to realize that that is the very hottest square centimeter or less on the very hottest part, of the very hottest rod inside of the canister, so we are limited by that very small area, and everything else is below that, in some cases, well below that, you can see here, in some cases, some of the cladding is over understanding what is going on in the overall environment inside of a canister.

In terms of understanding the benefits of thermal monitoring, there are some very real, tangible benefits we can get by improving the understanding we have, and these benefits are both in terms of safety, as well as economics, operational flexibilities, and ultimately, transportation and disposal of fuel. We have some of them up here, kind of shown in the way of dominoes, where thermal monitoring is kind of the first domino that is able to knock down all the rest of these.

You see up there hydride reorientation, which recently came out, taking the position that, um, reoriented hydrides are not as big of an issue as originally thought, but if we don't have them almost at all, then there is no issue whatsoever, so if we're not getting to the temperatures and stresses that cause hydride reorientation, we won't have it, and then we won't have to worry about it, which then goes to the next domino, transportation, if we're not having reduced ductility of the cladding, transportation becomes much more easy, and it, um, can happen much quicker. Next, consequence evaluations, if the temperatures and pressures inside of a dry storage canister aren't as high as we originally anticipated, there's not as much of a driving force for anything to get outside of a canister, as well as there's not as much temperature to drive cracking at the higher temperatures. Moving on down the line, there's concrete issues, really the heat load, is how much, how closely can you space the fuel that goes into the repository, and if our heat loads are much lower than originally anticipated, we can, um, pack that fuel much more

closely, meaning a smaller footprint in the repository, it's easier to manage, safer to manage, and costs significantly less.

So, as you can see, there was, there's a lot of benefits to thermal modeling, and so there are a lot of people that are interested in improving the accuracy of these thermal models. So, EPRI setup the Thermal Modeling Subcommittee as a part of a group that is managed under EPRI called the Extended Storage Collaboration Program. I know many people in the room and on the phone have been to items related to dry storage, and so we stood up a Thermal Modeling Subcommittee about a year or so ago, and you can see that right now, we're kind of at the end of Phase Two and just getting into Phase Three. You'll see here all of the many different organizations that, well, maybe not even all of them, um, some of the organizations that are involved with this subcommittee, and you can see representation from all of the big fuel vendors or cask vendors here in the U.S., many of the national labs, as well as international organizations, as well as the Federal Office for the Regulation of Nuclear Waste Management in Germany, so you can see models are not a U.S. topic of interest, it's a worldwide topic of interest.

So, let's get into what was actually done. So, in the demonstration project, we loaded 32 HBUs into a metal cask, and, really, the purpose here, and I've done modeling in the past, and one of the, and this is not a knock on any modeler, one of the things, one of the traps of modeling is if you know what the answer should be, it's very easy to tweak your model to get that answer and convince yourself you did it in an unbiased fashion, but on a similar note, if you give a bunch of elementary school students the answers to the test, it's very easy for them to get all the right answers to that test. So, what we did is intentionally kept all of the data blind from our modelers. They were actually very upset with us for this. So, we kept it all blind until after they did their models, and we give them everything they could ask for to go into these models, and, so, Jorge is going to talk a little bit about that as well, and I have a feeling our final slide is going to say about the same thing. I haven't seen the slides, but I'm just kind of making my prediction and see what happens, but we kept all of the data secret until after they told us what their models predicted, and then we compared the truth data against the models to understand what are the uncertainties, the biases, and the errors, and, so, we collected all that information, and we've reported on it, and there will be an official EPRI report coming out early 2019 on that data.

So, here, we have a video of the actual course, public information. The Y axis, if you can't see it, those are the different thermal temperatures in degrees Celsius, this is during the loading process, during vacuum drying, as it goes up, and you can see right about now, it's going to have the helium insertion, and you can see the temperatures start to go back down, as well as the shape of the curve changes, and the shape of that curve changing is a very key point in that we call this TN-32 to be a conduction only system. Well, as you saw right there, as that thermal profile changes, that's a very clear indication that convection is happening within that canister, so even though we call some convection, but that said, conduction is the dominant mechanism within this canister.

So, here, we're trying to avoid hiding the cookie. You can see the different temperatures, if you look in the table here, we have the table of the FSAR values, these are the inputs that we have, the 36.9-kilowatt heat load, as well as design specifications from the FSAR that have gaps in the model, and the FSAR predicted temperature, the final safety analysis report came up with 348, and we know that was a little bit overestimating, so the license amendment request that went in took a little bit more accurate look at these and came up with, um, with a little bit more accurate assumptions, 318 degrees as a peak cladding temperature, compare that to the actual temperature we got, which was about 229. Much, much lower.

So, you might say these thermal models are crap, but what I'm going to tell you in just a minute is it's not the thermal models that are crap, it's the input that we're putting into our thermal models, and we'll get into that in just a second. So, you see here, these are the different temperatures that we have. Typically, the far left-hand side of each of these graphs, these are the seven different thermal models and the nine different temperatures that were along each thermal models. You see in the black was the actual temperature, and then all of the other, um, temperatures were in blue, green, and red, those are the thermal model predicted temperatures from the best estimate models, and then the line, the red dash vertical line is the license amendment request value, so you can see, in pretty much every case, our thermal models are overestimating the temperatures, but very far away from that design licensing basis in the LAR, and so we're going to delve into a little bit more of why that's happening.

So, if we take the difference map of all these, so take the actual temperature, subtract it out of the model predicted temperature, we can get the differentials, and you see those here, and typically, they're about 25 to 35-degrees Celsius over predicting, and some cases, we get close to 100-degrees Celsius, so we want to understand what is the impetus for this. I got my 5-minute warning, so I need to move quickly. You can see zoomed a little bit more, um, this is what we're looking at, and, really, what it comes down to is if you look at the red lines, this well as an improved understanding of the ambient temperatures that were really happening, as well as the decay heats, and if you look at this and correct your model for the true close to the real values. Again, this is just some more data, looking at it from a different perspective, so you can look at this in your own time, we're going to keep moving.

Finally, this is the comparison of the data from the outside of the canister, and you can see on the far left-hand side, the different areas where these data points were taken. So, on the outside of the canister is a lot easier, there's fewer variables, we're closer to the environment, so you can see our models lined up, in general, pretty well with the actual temperature measurements. Again, for the next row, and for the third row. So, in essence, we can get those external temperatures very accurately, but we're a little bit less accurate when we go inside.

So, the bottom line is we got a lot of value out of this project. It may not have been the original value we anticipated, but that the thermal models do a very good job in identifying the trends in the data, in terms of getting that curvature right, although we are consistently biased to the high side, and so we want to understand why are there such large differences, especially between that license amendment request, the LAR, or the FSAR and the actual temperatures, and, really, it comes down to three things. The first is we're taking, in these license amendment

requests, a pretty significant decay heat penalty, where we knowingly overestimate those decay heats by on the order of 17 to 20 percent.

Second, we assume a much higher ambient temperature than what we're actually loading at, and third, um, for this, especially for this conduction-based system, or conduction-dominated system, we're assuming larger gaps that are actually happening in reality, where a lot of those gaps may actually be closed so, when we take these three items into account, if we take very simple steps instead of very difficult steps, just simple steps of adding inputs, we can get greater outputs.

So, I like to compare this to, um, we have our computational fluid dynamics model, it's like a Ferrari, probably a lot more expensive, but we have this wonderful machine that can do awesome things, and then we're pouring saw dust into the gasoline that goes into our Ferrari. Now, I don't have a Ferrari, I probably never will have one, not on a small non-profit research salary, but if I ever were to have one, I know I wouldn't be pouring saw dust in the gasoline, so what I would encourage all of us to do is not do the same thing to these high-performance models.

Bottom line is when we add in this third column here, the best estimate, you see we're still a little bit biased to the high side, but we're much better when we understand the true conditions going into these casks. So, the bottom line, what we want to do is understand what are the true margins, and if you see here, um, we have kind of a very simplistic description of the 400°C limit, a lot of our models had been going in, kind of getting really close to, maybe within a few degrees C of that limit, so understandably, there was a lot of concern about is there something happening to the fuel, and, so, if you hit next one time, you see our real temperatures are significantly below that on the order of 100-degrees Celsius or more.

So, that is our design basis versus our actual margin. The second thing we need to realize is fuel doesn't just start to break apart at that limit. What is the true limit? We're not sure. That is a subject for potentially more research. In France, of course, they're using the same alloys as we do here in the U.S., and they have a limit of 450-degrees Celsius. They're transporting after a year and a half of cooling. So, what is the true limit? It's a little bit nebulous, but if we go forward, it's certainly higher than 400. So, that limit, compared to the actual temperatures, where we thought we were really close, maybe within a few degrees C, we actually have very large margins between reality and theory.

So, that is our peak cladding temperature margin. I wish I had the clicker, because I like to have full control, kind of like David Victor. So, our overall margins are much larger than we had originally anticipated. So, just a few years ago, there were many people that thought we were very close to these margins. That, I think that was my last slide, so I will stop talking. (Applause.)

BOB QUINN: Thank you, Jeremy. I think our challenge now is to figure out how to take advantage of all that that you just found. Maybe our next speaker can shed a little light on that

for us. Dr. Jorge Solis is a Senior Thermal Engineer for the Office of Nuclear Material Safety and Safeguards at U.S. NRC, so he's responsible for forming technical reviews, storage and transportation casks, and for developing technical review guidance in computational fluid dynamics and best practice guidelines. He has over 15 years' experience in this and more than 20 years of engineering materials and spent fuel storage and transportation packages. Doctor Solis received his Ph.D. degree in Nuclear Engineering from Penn State University.

JORGE SOLIS: Good afternoon. I'm going to spend a little bit of time discussing the title of my presentation, Thermal Analysis of Dry Storage Casks: Verification, Validation and Uncertainty Quantification. Really, the title is important, because it actually involves what we have been doing in the thermal area for the last two, three years, primarily focusing on developing, um, current guidance when it comes to, um, verification/validation, and, of course, um, the NRC has been involved in the verification and validation in the past, this is not new for us.

Of course, um, additional contribution on this work -- inaudible -- really, so this is, um, the new area that we're trying to address, and by doing this, we're trying to help us help you to develop better and more detailed guidelines.

Of course, we have to keep in mind that, um, certain qualifications requires a lot of simulations, so it's really involved. For this case, it's, um, a word of advice would be to, um, perform best estimate calculations. Um, again, we conduct reviews in accordance with 10 CFR 72 and standard review, which, actually, it was developed to give a review of the dry storage system scope, and also identify acceptable approaches to the requirements. Of course, the, um, SRP doesn't provide the necessary guidance for, um, every aspect of the design, for instance, various specific guidances are developed to supplement for the SRPs.

On specific topics, for example, the use of, um, best practice guidelines is one example, and, of course, um, this, um, guidance, when applied correctly, um, it's going to simplify our review times. Of course, as it was mentioned before, the spent fuel must be collected during the entire storage field, and, of course, there's discussion about what limits to use, but for the time being, um, one way to keep that and protect it, protecting the fuel is actually keeping that temperature below the 400-degrees C. Really pushing the limits, so, really, the margin is really, um, slowly in and out. We need to properly verify it and validate them, and in some cases, when the margin is, um, small, we need to perform certain qualifications, and, of course, in the previous presentation,

Brian talked about the implementation and guidance for the 72.48 process and just, I just want to say that the NRC is still focusing on safety, by assuring that these changes are technically adequate. Of course, also, in the previous presentation by Jeremy, he talked about the, um, thermal initiative, and, of course, um, he mentioned that there's a lot of conservative in the temperatures. We have several meetings with EPRI at their office, we brought that issue during the last Used Fuel Conference, and also, um, to organize with the laboratory. We have actually stated different professional opinions.

They're very accurate, actually, because we calculated the uncertainty in the analysis. Of course, participants were not, um, were just instructed to, um, to use the FSAR information to build a model, and, of course, we knew that, um, the assumptions and analysis were very, um, conservative, specifically when it comes to, um, gas between components, we know that that's going to affect the results, and actually, the NRC was the only participant that actually went beyond what's required in the exercise by performing this quantification of uncertainties, and actually, that was because this, for us, it's not just this specific exercise, actually, for us, required when margins are almost gone, so we need to develop this guidance and state specifically what we want to see when we see applicants coming with very small margins per se and just not, for instance, mentioning that your model is very conservative.

I believe there's going to be another presentation that is going to show a cartoon, to show, um, how big the margin in the regulatory process. I think it's misleading. It misleads industry. It misleads CoC holders, the NRC staff, and the public, and it doesn't reflect reality, therefore I will just say that the NRC, um, doesn't regulate on this actually, but actually on fact. If one wants to claim margins, they need to be quantified, if they decide to do so.

The last presentation didn't mention Phase One, which is dry cask, which is actually part of the thermal initiative. We have shown in the past that, actually, um, our pricks were, um, just tried on the spot when cladding temperature is the most important for us, but, of course, there were measurements on measurements were actually non-conservative, and however, since I said we're focused on the peak cladding temperature, and that, for us, is great, and I think that should be also, um, be advertised. Really, I'm just going to summarize what this is all about. It was successfully below ground, wing testings, and as I said before, the comparisons show favorable agreement with both peak cloud temperature, because this is what it's supposed to do for ventilated systems.

So, I'm just going to mention that, um, any method is not complete. Again, these are, um, just a summary of the results. I'm just going to say that, um, considering all the uncertainties, um, we show favorable agreement when we include the uncertainties in the analysis. So, a lesson learned from this effort is that, um, if one actually wants to claim conservatisms, they need to re-quantify, and actually, this is very important, especially for licensing analysis. Again, it's just, this is, um, repetition of what I've been saying, so, um, basically, based on this, for both the, um, simulator and the TN-32, we believe that, um, introducing the margins should quantify specific uncertainties.

Again, this is the entire, um, summary of why we're doing this, so, really, as I said in the beginning, this is, um, we're providing the guidance, and that's based on what we're seeing with applicants, that actually, they are pushing the limits, increasing the heat loads, reducing the margins, so if they want to claim conservatisms, they need to quantify them before they can say that they actually are good results, and the only way they can do that is to perform a quantification of uncertainties. This is just a summary of additional guidelines. These are available for you, please use them, use the reports as soon as they come, and then just go through the summary on the last slide. So, as I said, there are ongoing efforts and on certain

quantifications and shows that it's good actually, provided that you perform the uncertain quantification when it comes to comparisons to the dry cask simulator. It actually compares very well with the, um, temperature that we measure, and again, as I said for the, um, TN-32-B, since we perform the on this. Thank you very much for your attention. (Applause.)

BOB QUINN: Thank you, Jorge. Very good. Appreciate the clarity. Um, last, but certainly not least, is someone we're all familiar with, Rod McCullum. I don't know that he needs a big introduction, so he won't get one. Rod's been working on regulatory issues since 1998. That's a long time. What do you do? Project Manager for Used Fuel and Decommissioning at NEI. He's actually had prior positions with the government at the DOE and with industry at three different commercial utilities. He has a Bachelor of Science degree in Nuclear Engineering from the University of Cincinnati and a Master of Business Administration from Louis University. Please welcome Rod. (Applause.)

ROD MCCULLUM: Always appreciate the Bearcat references, and the basketball team is 9 and 1, the football team finished up at 10 and 2, but few people other than the alumni actually care, because, you know, we're not competing for a national championship or anything like that. Um, yesterday, I had the distinct honor to, um, chair a panel of, um, really esteemed innovators advancing our technology over the years, and, you know, they talked about their vision for the future, and, you know, I asked, I think, the audience the question at the time, are we there yet, and nobody raised their hand. Does anybody think, after hearing what Jeremy and Jorge said about some of the thermal things, are we there yet now? No. No, we're not. So, I'm going to try to outline how we can, in the regulatory framework, pave the way to get there, to get to the used fuel problem, because as Jeremy said, this goes to transportation, this goes to disposal, this goes to decommissioning.

So, if we go to the first slide, I must point out, and this is kind of like what I just said, that NEI only does four things, and they're all connected. You know, we have almost a hundred people, and we only do four things, but there's a lot in these balloons. We preserve, sustain, innovate, and thrive. This is how we represent the nuclear industry. Preserve is all the market reforms that provide value for benefits, the always on power benefits, and you've seen these things happen in New York State, where measures were put in place to, in the electricity markets, value the benefits of nuclear energy, because while, um, hamburger and filet minion do come from the same cow, you don't pay the same amount for each of them, so all forms of electricity are not, you know, we love to turn on the switch, it's just electricity, not true. Sustain, this is where we work right now on and other things. You know, we realize that, um, market reforms alone aren't going to make nuclear energy cost competitive.

We need to reduce our costs, we need to reduce the costs that are regulatory-driven, but we don't blame it all on NRC, we understand there's a lot of other opportunities here, and we're working on those, and if we preserve and sustain the industry, then we can innovate, then we can build the next generation of reactors that do need to be very different from the generation that we have out there today. We are competing with the world, we can thrive, which means we're competing globally. Now, NRC doesn't care they just care that whatever it is, it's safe, but

whether or not, you know, if we're thriving, if we're competing globally, the United States has a leadership position in, um, the nuclear world, and whether it's just in decommissioning the existing fleet or whether it's in building in used fuel, where we tend to be laughed at by other countries, because we have no repository to store used fuel.

If you read the transcripts to Commission briefings, but in this case, I am going to recommend that you read the transcript to the, um, October 10th, um, October 11th Commission briefing, where, um, John and Mike and Mark briefed the Commissioners on everything going on, and, you know, again, I would pull the transcript or watch the video as opposed to try to read small words on the screen here, but what is being said in each of these bullets is what I would call in one word: alignment. Now, as Brian said, on change control, the NEI-12-04 guidance is not we've reached alignment, and the statements that were made by Mark there, and as Brian said, that was a long process with a lot of back and forth and negotiating of punctuation marks to get us there, but we are there. We have, and Brian described that process. Um, aging management, NEI-14-03 is in the same boat as NEI-12-04, we're expecting a letter, then we'll get a reg guide, partial endorsement, full endorsement, but we're in alignment. NUREG-1927 references NEI-14-03, so, again, the statements made there, um, by John demonstrate alignment, and I know Don, similarly, your pilot is, the TN pilot is not, um, quit changing your name. (Laughing.)

ROD MCCULLUM: Um, it's not, you know, approved yet, but as the statements made, I think we are aligned on what should come out of that. So, these are things that I have been talking about, you know, Bob said I talk a lot at these kind of things, and that's probably too much too true, but, um, these are things I've been talking about for the last couple of years, and I don't need to talk about these anymore, because these are real, tangible improvements that will said yesterday, there's a nexus between efficiency and safety. The more we can focus resources on what's important to safety by not focusing resources on what's not important to safety, the safer we are. So, three checkmarks, improvements, alignments, things I don't think I'm going to need to talk about at these forums again.

Now, going on to the next slide, if you continue to talking about just recently, which is where do we go from there, because even with those three accomplishments, we're still not there yet. You all knew about those accomplishments, but, um, in terms of, um, thermal modeling, here, Mark is saying, hey, he's seen the curves that Jeremy showed us, and he's seen that there's margin there, he's telling us that he has a positive outlook, that, um, we will be able to forge a more efficient licensing process.

ROD MCCULLUM: This is the demonstration of the thermal margin we have based on the only solar installation in the world. (Laughing.)

ROD MCCULLUM: You know, and again, as I said at the outset, the dominoes are important here, because this is how we get better at solving the used fuel problem. This enables us to transport, this enables us to get the decommissioned plant shut down and safer faster, this

enables so many things, if we can just get more efficient. Now, this is what it looks like in thermal modeling.

Go to the next slide, and I kind of mused talking about, because he was talking about uncertainties. Jeremy also said we have margins in both directions here. We have reality, we have what our models tell us, we have established limits and criteria, the 400-degree C is viewed by NRC right now as a cliff edge. Well, if it is, indeed, a cliff edge, if that's where safety really exists, then they're routinely driving dry fuel casks off cliffs, and, of course, that red line, that's where we really would hit the safety limit, and some people in this room think that that red line is way out there in the parking garage, some people think it's right on top of the purple line, we don't know, and that's what creates the problem, what we are debating, and Jorge had a lot to say about the quantification of uncertainties, and I know those who are involved in licensing reviews right now, there's a lot of resources going into the thermal modeling, the uncertainties, the space that is a long way from limits, a longer way from safety, and on the conservative side of reality, but Jorge's point is very valid, that if we don't really know how far, you see there's no numbers on this chart, we really don't have a quantification of how far apart from reality we are, we don't have a quantification of where our limits stand with respect to safety.

We know it's a big distance, Jeremy's told us enough on the thermal side and in a couple other areas I'll get to in a second that we know it's a gap, but we therefore find ourselves spending our time in that little tan oval, debating the differences between what one model says and another model says. So, um, fortunately, there's good news. This dilemma has been confronted already in the reactor world. Here, we see that a lot of work has been done over the past several years to actually quantify the regulatory margins to the safety goals that exist in reactors.

Now, keep in mind, if these are the margins, factors of 100 to 10,000 that we've now quantitatively identified, boy, dry casks are not as much risk as reactors, so I'm thinking the margins are even bigger, but we do have a task in front of it to quantify this. We have turned this into action, which has made it more efficient and thus safer. In 2018, five risk-informed applications were improved on the reactor side, there's seven more in process, NRC has committed to a twelve-month schedule to review these, because that process is now well-understood enough, and the margin is agreed to that we can actually risk-inform, and what that means is that maintenance programs and a lot of other things are now going to be more important to safety. So, understanding margin can be turned into action that makes it safer, that is the task in front of us here. So, we talked about thermal, um, that's one area where we need to better understand that margin, quantify it, we talked about radiation.

And the vendors are working on their things and, you know, we've gotten a lot of confidence in our ability -- so David Victor talked about the inside and the outside. Well, our radiation models are just as conservative as our thermal models, so we got margin, that figure applies to both disciplines, and then the canister integrity. Here, there is a time or temporal aspect to margin. We've got every susceptibility criteria, so we know what environments are going to be most corrosive, we've been doing inspections, refining our inspection technology, we know nothing happens fast. If you look at all three of these things, we can make a powerful case, and this is

what Mark was alluding to, and maybe by the time he retires, I think he's going to provide us some more information, I'm hoping, too, in terms of this, but we can make a case that we do understand those margins and make them more efficient.

How am I going to do this? I need a lot of people smarter than me, because I'm good at proposing things, but then in order to actually capitalize them, like, for example, the role all of you played in those three successes I talked about at the outset, um, we need to develop a systematic approach, just like the reactor people have, to, um, applying known margin to facilitate more efficient reviews, and as Brian alluded to, the flip-side of this is safety-focused inspections, because if you have too much stuff going on in the licensing process, you get that out of there, but to make sure, those inspections have to be focused on safety, the ones we do, the ones NRC does.

So, I've heard loud and clear from Mike that we want NRC working on, um, the case work, to be incumbent on industry to propose a solution. We need to pre-align with NRC on a submittal form and an improvement endorsement pass so there's not uncertainty on when we get to the end here. That path needs to be described so that it supports the plans and the interim storage facilities that want to begin receiving fuel in 2023, and I think they'll get there. It needs to be an NEI collaborative effort, and I need volunteers. My e-mail address will be the last slide here, but, please, I need smart people to help me on this, because a lot of smart people worked on that reactor stuff that's now being applied. I heard something yesterday about topical reports. Maybe we should use those. I don't know, we need to define the path, so I'm hoping, Mike and John, we can get a public meeting early in 2019, I'm hoping by the time of the US on that path, because I really think this is a key part of the solution. Again, volunteer early and often. Now, I did tell you a lie at the beginning of my chairing that session yesterday that I would tell you the latest data play on the political solution, but if I get a question on it, I will answer it, okay? (Applause.)

DANIEL MUSIATTI: Okay, we seem to be about on time. Thank you for letting us finish the day by drinking from the fire hose here. Do we have any questions in the room? One, of course.

JOHN MCKIRGAN: Rod, I want to, um, ask, um, where you left off in terms of, um, next steps, and I wanted to make sure I understood the analogy you were bringing, and to make sure we're aligned, and I look at the reactor world, which I spend a lot of time in and the 50.59 process, and there are decades of work that brought the industry and the agency to the point that they got, and I want to make sure we have realistic expectations about, um, bringing that analogy over into this environment, and so I wondered if you could elaborate for me a little bit about how you see that playing out. There are, um, there's a rich history there, and I'm with you in that I'd also like to try to learn some lessons and not, um, repeat some of the challenges that the reactor community had in that process as we try to migrate that, if that's the path that we're going to take.

ROD MCCULLUM: Yeah, and, um, I think that, um, there's two aspects to that. First of all, a dry some pretty sophisticated PRAs in the reactor side, and they tripped up a lot, it became, the art

of the PRA itself became more important than what the PRA was intended to accomplish, and, so, we got past that now. I don't think that level of PRA sophistication that level of analysis that took all those years and all that effort is going to be necessary on the dry cask side, but I do think we need to align and agree on what we do need to inform us, and as you say, they had a lot of information. Well, so do we. We've loaded 3,000 of these systems, you know, we don't just have one demo, we have two demos, we have the original cask that didn't even, also loaded at one of the dominion sites, it didn't even know it was going to be a demo cask when it was loaded, but we took it out to Idaho and opened it up around 2000, and low and behold, ourselves that doesn't apply right now is what we call low burnup fuel, you know, we, in the industry, shoot ourselves in the foot a lot, and this is one of the worst examples, why we ever coined the term high burnup fuel, I don't know, because I still don't know what magically changes that happen are actually more favorable to fuel integrity, things like the, you know, the pellets swelling actually strengthens the cladding as they're compressed against each other.

We have already started to build up a database of inspections, we're putting AMID in place, we can take a learning approach, so I think we can travel that journey that the reactor folks did a lot easier, but I need smart people to help me do that. I still don't know what to call this might be writing something before he retires, so I need some smart people to help me, some people who can get me into a territory where we can do this in a straight-line path and get there in a meaningful timeframe, we're shutting down a whole bunch more plants in 2020 and a few in 2019, those are going to be ready to move fuel to an interim storage facility by 2023, and know where those margins are so we can act on that and simplify our processes.

SPEAKER: Maybe this isn't, probably not a question, maybe more of a comment, it relates to um, you know, risk-informed decision-making, the level of risk versus, maybe, perceived risk and a lot of things, and as a utility that uses lots of dry cask storage systems and a member of the public, you know, I respect that we need to be cautious, we need to make sure we're maintaining proper margins, I want to see that, and I believe in that, but at the same time, as we learn more and learn that we have, maybe we're not where we thought we were, um, we also need to leverage, you know, the potential that gives us. You know, we talked, um, one of the presentations, you know, we don't see us, our vendors don't see us going to 45, you know, or 50 fuel assembly systems, you know, we're looking to leverage the current systems we have now and make them more efficient for us, the users, and whether that's to demonstrate, maybe, we have a little more margin, um, and maybe we want to preserve some of that margin and, you know, not take it, I'll say take it all back, but maybe leverage it a little bit to give us more flexibility to load the things we need to load, to keep our plants running, I don't know, but the answer is not to, we can sit here and debate it, maybe it's kind of like the SONGS thing, you know, we each have different perspectives of it, where, me, as the end user, get a little and debate it for decades and not do anything is not necessarily the right decision either, we have to figure out how to move forward and either acknowledge the margin that's there and make the decision that we have the margin and we're going to leave it, you know, we're not going to do anything about it, or do something with it, maybe use a little bit of it, but the answer is not to stick our head in the sand and ignore it.

ROD MCCULLUM: So I'll take that that you volunteer to be part of the effort? (Laughing.)

ROD MCCULLUM: No, I'm not one of those smart people that you're referring to that you need, so sorry about that.

DANIEL MUSIATTI: Another question.

SPEAKER: Bob, wonderful job. Excellent panel. Good job pulling if we don't have any margin, or we don't know how much we have, and then I heard let's do something with that margin. I think they really all do tie together. It's the same story, just different perspectives, um, and I'm looking forward to this effort, Rod, of us, yeah, that's a good goal, by the NEI meeting next May of let's have some sort of plan together on where we're going to head with that.

ROD MCCULLUM: So you're volunteering?

SPEAKER: I'm already part of it. (Laughing.)

SPEAKER: I guess one key area that I heard was, um, like, Jorge, on the BWR simulator, that was a much more controlled experiment, great, then you go to the hybrid demo that's not so controlled, but it's reality, so in comparing those two different tests together, I think what comes out of that is the models are good, they know the physics, we can get this right, if we have inputs that are proper, but what it told us was one huge factor is the decay heats, whereas on the Sandia work, you know, we knew exactly what kilowatt level those were going at, so you knew that. Not so much on the demo. So, I think that's probably a big chunk and one of the first pieces to lay on the table of where do we go with this.

DANIEL MUSIATTI: We are getting closer and closer to winding up here. I would like to leave enough time here at the end of this meeting to invite Mike to come up and give us a last word or two. Folks on the phone, do I have anybody on the phone that would like to make a comment related to uncertainty?

PHONE OPERATOR: I am showing no questions or comments at this time.

MIKE LAYTON: No comments at this time. Okay, thank you very much. Back to the room one last time. Then I'm going to turn the microphone over. Okay.

MIKE LAYTON: Rod, what is the current political -- (Laughing.)

ROD MCCULLUM: Thank you, I'm sorry I lied to you yesterday, but I knew we had people on the phone and I didn't want to step on their time, but the political state actually changed dramatically yesterday, so I would have given you a different report today as yesterday.

Um, how many people saw the video of that meeting in the White House? Yeah, or read about it. Um, I won't tell you what my personal opinion of that is and how it was conducted or what

political party I'm on, which is neither, but, um, I will tell you that that was the start of a negotiation, a very significant negotiation. It kind of sounded like wall, no wall, wall, no into that. What is Trump going to give to get his wall, or if he doesn't get his wall, what are the Democrats going to have to give?

And I will tell you, absolutely, you know, David Victor halfway through Congress, and now this is this Congress' last chance, and I will tell you, obviously, because there was an election coming up, we didn't get anything out of the Senate, but that election is over now, and there's a really, a lot of interest amongst the leadership in both the House and the Senate in moving used fuel legislation as part of whatever deal gets brokered. It's going to be this and that, then this, maybe a wall, a smaller wall, border security. So, my message to you is pay attention, but if you ever wanted to reach out to your Congressman, and if you're a federal employee, ignore this advice. (Laughing.)

ROD MCCULLUM: But, um, you know, now would be the time. This is going to go at least until December 21st, and we're starting to see it might even go sadly through Christmas, we could be, you know, having legislative discussions around the tree as we open our presents. I hope it doesn't go that far, but, um, again, used fuel will be part of it till the end. The chances are not hugely great, that we'll get something, but the chances are better than they have been in two years that we'll get something. I am also told that if you're going to reach out to your Congressman, tweeting at them is much more effective than calling them. (Laughing.)

MIKE LAYTON: So, please, stay tuned, and be supportive, because we got a real shot at something great round of applause. (Applause.)

MIKE LAYTON: And continue with the applause for yourselves, because I want to thank you all for a really good REG CON this year. (Applause.)

MIKE LAYTON: I do want to remind you with the like and dislike form, we do want to hear from you. What did you like? What don't you like? If you have any suggestions on how to change the format, I'm open to an awful lot of feedback and input from everyone. You heard from Rob that topical reports, we're open to. That's something that you haven't heard from NRC in quite a while. We're open to an awful lot of new ideas and new paths forward. So, with that, this REG CON is adjourned. (Applause.)