Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Office of Nuclear Material Safety and Safeguards: Extended Storage and Waste Confidence Webinar

Docket Number: n/a

Location: n/a

Date: Wednesday, December 14, 2011

Work Order No.: NRC-1390 Pages 1-62

NEAL R. GROSS AND CO., INC.
Court Reporters and Transcribers
1323 Rhode Island Avenue, N.W.
Washington, D.C. 20005
(202) 234-4433

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

+ + + + +

EXTENDED STORAGE AND WASTE CONFIDENCE WEBINAR

+ + + + +

WEDNESDAY,

DECEMBER 14, 2011

+ + + + +

The webinar was convened at 2:00 p.m., Lisa Janairo, The Council of State Governments, Midwestern Office, presiding.

PRESENT:

LISA JANAIRO, The Council of State Governments, Midwestern Office

CHRISTIAN JACOBS, NRC, Office of Nuclear Material Safety and Safeguards

CHRISTINE PINEDA, NRC, Office of Nuclear Material Safety and Safeguards

JAMES RUBENSTONE, NRC, Office of Nuclear Material Safety and Safeguards

TABLE OF CONTENTS

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

(2:00 p.m.)

MS. JANAIRO: And the recording will be available on the NRC's public meetings page later this month. GoToWebinar will also have the recording archived on its website, and you will all receive the link to that recording and a followup message that will go out this week.

Second, to reduce the possibility of feedback or other external noise, all lines are in listen-only mode right now, and they will stay that way during the presentations.

The speaker will answer questions after all the presentations are complete. We will take questions in the order received. You have two options for asking questions. You can submit them using the GoToWebinar questions panel, or you can raise your hand and we will unmute your line.

Please identify yourself when you ask your questions. If you accidentally click on the button to raise your hand, just click it again and it will turn off. If you do ask a question or make a public comment, please refrain from using a speakerphone to help ensure high audio quality.

And, finally, after the webinar, a brief

survey will pop up. Please take the time to fill out the survey, so that we can get feedback to help the NRC improve future webinars.

I will turn the floor over now to Chris Jacobs of the NRC to explain the purpose of today's webinar and to introduce our speaker.

MR. JACOBS: All right. Thank you, Lisa. Welcome everyone again, and also those who are just joining us today. My name is Christian Jacobs. I am the project manager for the NRC on extended storage and transportation.

One quick reminder -- please let us know now, or at any time during the presentations, if you are having difficulty hearing us. You can do this by raising a hand or sending us a chat message.

Similar to yesterday's webinar, we have set aside time in the agenda for Q&As after the presentations have been completed.

First, I want to once again thank Lisa Janairo from The Council of State Governments, Midwestern Office, for all of her assistance in helping the NRC set up these webinars. I also want to thank again those members from state governments and from the public who are participating in this webinar with us today.

The purpose of these two webinar sessions -- yesterday and today -- is to inform all of you about the NRC's plans/activities on technical and regulatory issues related to extended storage and transportation, or EST, of spent nuclear fuel and on plans to develop a draft environmental impact statement for an update of the NRC's waste confidence decision and rule.

We had three recent public meetings in September and October regarding these two subjects -- EST and waste confidence. Today's session provides us another opportunity to share this information with those of you who were unable to participate in the previous meetings.

Yesterday we primarily focused on the waste confidence activities, but today we will concentrate more on the EST activities. And one followup from yesterday, there was a question about notes from the meeting. We don't provide notes of these meetings, but we do provide a meeting summary. And that will be posted on our website within 30 days from the date of this webinar. We most likely will have it out in the next couple weeks.

Now, I would like to introduce Dr. James Rubenstone, who is a branch chief in the Office of

Nuclear Material Safety and Safeguards. Jim will be your speaker and presenter today. I will turn the mic over to Jim.

DR. RUBENSTONE: Thank you, Chris. And thank you to Lisa and to The Council on State Governments for allowing NRC to use this media forum -- webinar -- to reach a greater share of the public to talk about our plans for extended storage and transportation, and, as we discussed yesterday, work towards a possible update of the waste confidence rule and decision.

As Chris noted, we have had some public meetings before, and this is a followup. The same material that we presented at those meetings is what we are using here.

I will begin with the same slides that I used yesterday, and I apologize for those who are hearing them a second time. But I wanted to make sure that everyone got the same story on both days.

To start with, I will talk a little bit about general plans to -- by NRC to ensure the continued, safe, and secure storage and transportation of spent nuclear fuel.

We are in a state now where there are uncertainties in the national policy, and some things

do remain constant. The Federal Government still has the ultimate responsibility for commercial spent nuclear fuel used to make electricity. And as the national policy goes through this period of change until a clear path emerges, the extended storage of used or spent fuel is probably going to be in our future.

NRC's mission, as it says here, remains the same -- protection of public health and safety and promoting common defense and security and protecting the environment. As NRC moves into this new phase, we are trying to take a systems level approach to everything that happens in the back end of the fuel cycle -- the back end being the state of the fuel once it leaves the power reactors.

We want to make sure that we can continue to ensure safety as the policy evolves, as I said, and we will provide any information we can to the actual decisionmakers, which include our own Commission as well as other parts of the government.

We are trying to do this in an integrated fashion. We are working to look at all of the aspects of the back end of the fuel cycle, which includes onsite storage, possible storage at other sites, potentially reprocessing if that becomes part of the

U.S. national policy, and then ultimately geologic disposal of the fuel. Geologic disposal is still seen as the ultimate end.

We are trying to work together with all parties who are interested in this. In the U.S., that includes primarily our NRC licensees, the utilities that have produced the fuel and own it now, the vendors of the storage systems, as well as other interested local and national public interest groups, members of the public, and of course state government.

Internationally, we are working with our colleagues in other countries who are facing similar issues with extended storage and other forms of dry storage. Some of those are already -- been doing it for some time and have some experience. Other countries are about to embark on this and are -- we are helping them along the way, and we are learning together.

We want to engage the stakeholders as often as possible to make sure all issues are considered. How can we involve stakeholders? We are actively seeking input and feedback, and this webinar is one of the tools we are using now and hope to be using more in the future.

We want to encourage interested parties to

stay involved as these things proceed. We are basically in the early stages, which I will talk about in a minute, of putting our plans together. So we want to get the plans out there, so people can see what NRC is planning and give us some useful input. And I think this is -- this webinar is one of our new web-based tools that we will be using more in the future.

We also are setting up -- and these should be available very shortly -- an email address for the extended storage program and an email address for the waste confidence program, which we will use to reach out to people to let them know, as our work proceeds and what reports of meetings are coming up, and to seek input and even specific comments on certain reports as we develop.

So that's the introduction, and we can move to the overview. This part gets a little more specific about the two projects we have going now -- the update to the waste confidence decision and our work on the technical issues related to extended storage and transportation, which is the main focus of today's webinar.

These are complementary initiatives. They are going in parallel, and we are trying to use

information from each side to inform the other. Starting with waste confidence, which was discussed in some detail yesterday, this is a generic determination that NRC issues in order to provide a basis for continuing licensing of nuclear powerplants and basically sets aside the question of disposal and ultimate path of the waste from the individual reviews of the license renewals.

The waste confidence decision is not specific to any given site. It is not for a specific licensing review or licensing decision. It was most recently updated about one year ago, in December of 2010, where the Commission stated that they have confidence that the waste can be safely and securely stored for 60 years beyond the life -- the licensed life of a facility.

At the same time they issued that decision, that directed the staff to prepare a long-term update for life beyond 60 years plus the life of the facility, and at the same time prepare an environmental impact statement to look at what potential impacts would come about from that extended storage period.

So the EIS that we talked about yesterday, the waste confidence decision, and a possible change

to the rule is what we are rolling up as our waste confidence project.

In conjunction with that, we are looking at technical issues related to extended storage and transportation. And these involve a number of areas, which I will talk about in a little more detail in the next set of slides.

Our goal there is to fully understand the potential impacts of extended storage in terms of material degradation and other things that may impact the safety functions of the storage system, so that we can ensure that storage continues in a safe and secure manner, and that any transportation that is related can also be done in a safe and secure manner.

By definition, storage is an interim solution. Any place where things are being stored they will need to be transported from that, at least one time and maybe multiple times if there are consolidated storage facilities, before things reach their ultimate end in a disposal repository, or in some reprocessing.

And the activities we are doing under the extended storage and transportation program begin with technical investigations, but they are directed to possible changes in our regulations and the guidance

we provide. And of course we want to engage stakeholders on both these initiatives.

Here are some of the commonalities. Both the waste confidence and the extended storage program focus on commercial spent nuclear fuel, and they both focus on dry storage over long periods. Fuel, when it comes out of the reactors, is stored wet in spent fuel pools for some period of time until it has sufficiently cooled down to be able to be moved into a dry storage system.

Both the waste confidence and the EST programs deal with the same type of systems, the same type of physical processes and effects that can happen within them, so essentially the same types of technical information.

Where they diverge is in the actual use that we put these -- this information to. Under the waste confidence, we are focusing on environmental impacts as broadly defined in the terms of the National Environmental Policy Act.

These are impacts to the various components of the environment -- land use, air quality, potential radiation doses to the public, to workers, and transportation-related issues. It is a broad scope, it is defined well under NEPA, and we

will do that in a general fashion by using representative analyses.

And Christine talked about -- Christine Pineda, one of my colleagues, talked about this in some detail yesterday on the webinar, about how we were intending to approach this.

We are developing now a report which lays out some of the assumptions and scenarios that we expect to use as we move into developing an environmental impact statement and the formal NEPA process for that. This report should be issued for public comment some time within the next two weeks to a month, and we will certainly alert everyone who is on this webcast by our new email system that we are now into public comments and we are actively seeking your comments on this report.

The extended storage and transportation initiative focuses on the technical basis that we are going to use in any future licensing actions, and with a clear focus on the performance of various components to do their safety functions. And it will support our current regulations, any changes in regulations, guidance, and future reviews of applications as we move into longer-term periods of storage.

I think most people are familiar with dry

cask storage systems. This is one example of a canister-based system. There are also systems in use that have a more integrated overpack and canister together. The main goal of these is to provide a place for spent fuel to be stored dry in an inert atmosphere away from the pools.

There is currently about 1,500 loaded casks in the U.S. system, and there are independent spent fuel storage installations in I think 33 states at this point.

Almost all of these are at existing powerplant sites, including some decommissioned sites where the reactors have now been shut down and in many places disassembled.

As it shows here, there is basically two general designs, either a vertical or a horizontal layout, as you can see in the two right-hand photographs, the upper one being the vertical where there is a canister with a concrete overpack placed on top of it, and the bottom photo shows a horizontal where the canister is slid into this large concrete structure.

Now, as I said, there is a number of different designs used from primarily three vendors in the U.S.

Opportunities for engagement -- this project will be going on for several years and several phases, and I will talk about the phases in the EST in a minute. Our efforts right now are to define the tasks and develop our plans and schedules, and we are reaching sort of the end of our initial planning stage. Things are coming together, and I will talk about the EST plans. Christine spoke of the waste confidence plans yesterday.

We have draft reports coming out in each. I mentioned the waste confidence report. We have a similar report that focuses on the extended storage technical areas and where we feel are the highest priority areas for future technical work, and with some relative prioritization about how NRC views each of those areas.

That report is lagging a bit behind the waste confidence report, but we hope to have that out for public comment within a month or so. And, again, we will notify people when that is out and actively welcome your comments on that report.

The NEPA process that we will follow for the waste confidence work is also designed to have several opportunities for clear public engagement, beginning with the public scoping process which is the

first formal NEPA step as we develop the EIS.

We expect to have more public meetings. We expect to have more webinars. We are seeking the best ways to continue productive interaction.

There was a suggestion yesterday during our waste confidence discussion that we have another webinar some time during the comment period for the waste confidence first report that I am talking about. We are seriously considering that, and it looks like we will be able to do that. And we will get more information out about the date for that as it becomes more set.

So I am going to move into the last part of the discussion here, which is a little more detail about how we are going to go about getting the regulatory and technical bases together for our extended storage and transportation program.

Just as way of background, here is a picture of the foreground of one of these vertical canister systems. As I said, these dry cask storage systems are in use in 33 states now at a number of powerplants. They were first introduced a little over 20 years ago.

The setups at the powerplants are what we refer to as independent spent fuel storage

installations. That's shortened to ISFSI. So if I use that term, that's what I'm referring to.

NRC issues licenses for these independent spent fuel storage installations, and also provides certification of the cask systems for storage and transportation. These are done under two parts of our Code of Federal Regulations. 10 CFR Part 72 covers storage systems, and 10 CFR Part 71 is for the transportation.

There was a recent update just in this past year to Part 72 that allows for longer periods for the certificates and the licenses. Originally, these were 20-year periods. They are now 40 years on renewals.

The focus of course is on the safety functions of the system, and what we will talk about today is all of the safety-related areas that we will be working on. Security is also an important part of this. We are not going to talk about that specifically right now. Security for these facilities is covered under 10 CFR Part 73, and there is an ongoing rulemaking right now to enhance some of those regulations.

There will be work on the security aspects of extended storage that will lag a little bit behind

some of the technical work on safety. We want to complete the initial rulemaking and look at ways that you may need to enhance that, if necessary, for extended periods.

So as I mentioned before, potentially we could be changing the regulations, depending on what we find from the technical aspect, and guidance that we provide to our applicants as to what staff will be looking for when they do reviews.

One of these things we could do at this time is improve some of the integration of the regulations for the entire back end of the fuel cycle, and there has been suggestions that we could have better integration between the storage and transportation aspects.

We do need a clear technical basis for any changes we make, so we are looking at developing that basis now.

There is another initiative going on at NRC within the spent fuel storage area looking at our current licensing process, for ways to improve that and have more efficient and effective ways of carrying out that process.

There was a public meeting on that in July, and that is, as I said, an ongoing activity, and

there will be more news to that as it comes out.

We are certainly looking at risk-informing our regulatory approaches. By "risk-informing," I mean we want to keep the attention on those areas that have the greatest significance for performance and of course safety.

Here is the approach we plan to be taking. Broadly, there is three steps. Initially, we will be looking at the technical basis, identifying what issues are associated with long-term storage, and perform the necessary research on those technical issues.

Now, NRC will be doing some of this research itself as needed, but we also expect that industry and other parties, including the Department of Energy, will be involved and will be gathering information as well.

We will also be identifying what revisions we need to the regulatory framework, and then, as appropriate, make any revisions to the regulations through our regular rulemaking process, revise guidance, or develop new guides that of course keep our staff capabilities at the level they need to do effective review.

Our plans break out into three phases.

The first phase, as I said, is identifying the issues. We are close to the end of that initial phase, and the report that I mentioned will have those issues identified and laid out with some prioritization to them.

The next phase would be to perform that research. And again, as I said, NRC will be doing some of the research, but industry, Department of Energy, and some academic groups are also involved in some of that research that we will be evaluating and using as needed.

And then, the last phase would be any changes that are needed to the framework.

Here are some rough timelines, and these of course depend on how things progress and the availability of resources at NRC. As you can see, in 2011 to 2012, we are closing out this issue identification phase, and we will be developing a plan called the regulatory program plan here to lay out how we will be proceeding over the next several years.

As we pull that plan together, and we have the technical issues identified, we will be beginning the issue resolution phase and going through a regulatory issue identification process also in 2012, the following year, to look at areas of the

regulations that may possibly be impacted by any new information that we have for the extended storage and transportation questions.

In the regulatory, technical, and issue resolution phase, we will have a series of reports probably put out periodically as research draws to a close. That is the long leg of this exercise lasting over several years. At that end of that, we will develop a regulatory basis document which will be used to support any potential rulemaking or revisions to guidance.

And, again, these are just how we see the timelines emerging right now, certainly subject to change on something that is going out here for several years.

The technical issues that we are working on right now, we are looking at these systems, and I am going to talk in a minute about a few potential issues. We have broken the system down into their components and looked at their individual component safety functions and how they operate together to provide a safe means of storing fuel.

This is an example of a canistering system. As I mentioned, some designs have a more integrated canistering cask, and similar issues apply

to all. Primarily, the safety functions for all of the systems can be broken out into a few simple categories -- containment, confinement, keeping the fuel inside as originally loaded, control of criticality to ensure that there are no inadvertent criticality events within these containers, shielding to make sure that the radiation doses at the outside of the systems are low enough that there is no hazard to the public or to workers.

And retrievability is part of our policy right now, that fuel should be able to be retrieved from these canister systems at the assembly level.

How we get there -- there are a number of structural, mechanical materials, thermal considerations that are done in the reviews to demonstrate that these safety functions can be met.

Here is one example of a potential technical issue that we are looking at, and that is the behavior of the cladding on the fuel over long periods of time. Reactor fuel in lightwater reactors is uranium oxide that is enclosed in a zirconium alloy cladding. There are a number of different types of cladding in use today.

The primary safety functions are confinement, to keep all the fission products of the

fuel confined within the cladding in the physical integrity of the fuel and the assemblies, more retrievability, and that also provides geometry control for criticality. It is easier to analyze potential criticality when you know specifically the geometry the fuel is in.

Some of the technical challenges that we will be facing over long periods of time is higher burnup fuels, which is the growing trend within the nuclear industry, effects of temperature, both higher temperatures on the cladding and then, as the fuel cools over long periods of times, if those lower temperatures have impacts on the cladding behavior. There is a number of cladding types in use. There may be new ones being introduced.

And then, an ongoing challenge in all of these dry storage systems is if there are ways to monitor or image or in some other way gain information on the state of the fuel within a sealed canister without having to reopen the canisters.

Another prime example of a technical issue has to do with the integrity of the canister. The canister of course has obvious confinement function to keep the fuel assemblies within and providing an additional barrier if there are cladding failure

issues, and also to provide criticality control in that the canister is the primary moderator exclusion that keeps water from entering and coming in contact with the fuel.

Some of the technical challenges are all materials issues, primarily long-time -- long-term corrosion of the canisters, especially in more challenging environments, properties of some of the internal material like the fuel assemblies and the baskets that hold them in place, some neutron absorber aging-related materials inside the canister, and of course the question of monitoring a sealed canister to understand how it is behaving, both internally and the state of the canister itself.

A third example goes to the overpack. The overpack provides important safety functions and shielding, and to optimize heat transfer. These systems, as I said, are dry. They depend on natural convection of the air around them to carry heat away.

The overpack, as you can see on the right-hand side, it is not immediately in pack, but these have air vents for natural circulation of air to keep the heat away, which keeps the relative temperature of the canister sufficiently low, so that other materials issues don't arise.

Some of the technical challenges of course are long-term degradation of the response to any natural events or external disruption. The overpack has one advantage in that it is relatively easy to inspect and monitor compared to the canisters inside or the interiors of the canisters. So that makes that much -- that issue a little bit easier to deal with, but it still requires a rigorous inspection protocol to make sure you are catching issues before they become problematic.

Our current framework, as I mentioned, are renewable term licenses. There is an initial license for the facility and for the canister system itself. These are renewable at 40-year intervals. There is no limit in the current regulation to the number of times a license can be renewed, but each license renewal needs to come in with an aging management plan, which is an important aspect of our regulatory framework.

The aging management plan describes how the materials may have degraded or will degrade over the license period, and what potential impacts that would have on safety, what sorts of monitoring, maintenance, and corrective actions can be taken to mitigate those problems.

As I said, right now there is no term

limit on the number of renewals, but certainly the aging management plan is the key to justify a renewal. And NRC will review these very carefully and make sure that the aging management plan is adequate for the next renewal period and certainly reflecting the period that has passed before.

We have not done the rigorous regulatory analysis yet. That is on track to happen beginning this year. But some regulatory issues that may come up involve things like integration between the different states of the pack-in, storage, transportation, and potential disposal, how the regulations fit together, so we are not making things more challenging in one area by making them easier in another.

Certainly, the long-term integrity of the cladding and the interior internals of the canisters have implications for the retrievability function that we now would like to preserve. So that is one of the potential regulatory issues to deal with that.

And, as always, financial assurance is an important consideration, especially in facilities where you have moved into decommissioning and there is not an active powerplant at the site. It is important to make sure that there is assurance that things can

be maintained by the licensee in a safe and secure manner.

So, as I said before, stakeholder engagement is an important part of this process. We will be providing periodic updates to the Commission, which will be available to the public, as we move forward through this program. We will be issuing a number of reports for comment, and certainly the first one, as I mentioned, for the EST program is the identification of the technical issues and prioritization.

We are building in this report on previous work that was done by the Department of Energy, the Nuclear Waste Technical Review Board, the Electric Power Research Institute. Several other groups have looked at some of these issues.

We are taking those reports, pulling them together, looking at the state of the knowledge of the various issues and the importance for the safety functions as we go forward, to develop our own NRC prioritization. So that first report will be coming out in the near future, and there will be subsequent reports as we move forward on the technical issue resolution.

We are working with industry and the

Department of Energy in a number of ways. There is a program run by Electric Power Research Institute, which is promoting collaboration, and NRC is involved with that.

We will also be having regular meetings. I don't know if they would happen annually, but certainly on a regular basis we will be getting out to discuss these issues with the public and with industry and all of the participants in workshops to work through the technical issues. So we certainly encourage people to stay involved with this, and we will use our email list as best we can to keep you updated as these things are coming up.

So in summary, even as things change in the national environment, assuring continued safe and secure storage of spent fuel is NRC's main goal in this area. We are preparing to develop a regulatory framework to support that and coordinate the technical work among ourselves, among the other interested parties doing the work, and with the environmental impact analysis that we are doing to support the waste confidence.

And there will be opportunities, as we go forward, for stakeholder input through public meetings, workshops, draft reports, and more webinars.

So I thank you very much for your attention, and we can open it up for questions now.

MS. JANAIRO: Okay. Great. Thank you very much. If anyone has a question or would like clarification, please raise your hands, and I will unmute your line so you can your question. Another option is to type the question in the questions pane in your webinar console.

We have a hand raised. Rick Moore, we will go to you first. Hold on, Rick. Try again. Sorry.

MR. MOORE: Can you hear me okay?

MS. JANAIRO: Yes.

MR. MOORE: Okay. You mentioned several times integration is an important thing that you are looking at, particularly between storage and transportation. And as I understand it, there are several of these canister systems currently in use that the canister is probably not suitable for transportation.

So what I'm wondering is, as you look at the issues of integrity of cladding over time, it seems like the longer the cladding is subject to the heat and stress, et cetera, that it becomes -- that it is actually brittle. You really wouldn't want to have

to recask your fuel in order to transport.

But if there is no initiative to make sure that the fuel is canistered when it is put into dry storage in canisters that are suitable for transportation and potentially disposal, then you are going to have to rehandle the fuel and recanister at some unknown future time.

Is that one of the regulatory issues you are going to look at is to try to develop a way to come up with a standardized canister requirement that is suitable for at least transportation as well as the dry storage?

DR. RUBENSTONE: I think this is both a regulatory and a technical issue. It is my understanding that, although not all existing storage canisters are certified right now for transportation, they are potentially certifiable, and there is not -- we haven't identified any that we don't think could be certified for transportation. But we have to look at it on a case-by-case basis.

Certainly, it is in our best interest that we don't find ourselves in a situation where you are forced to repackage something just to transport it, and that is a prime area that we are looking at.

One of the goals of this, as I said about

the integration, is to take a hard look at the process that we are using now and see if there are ways to better improve it, so that you are not left with questions about whether a canister, you know, is suitable for transportation.

Certainly, when things are loaded into canisters now, any fuel that is classified as damaged is canned within the canister. And other initiatives are looking at canning different types of fuel as necessary. You don't want to impose this unless it is needed for safety.

But I agree with you that the idea of minimizing the amount of handling is a good thing.

MS. JANAIRO: Do you have a followup?

MR. MOORE: Yes, another related question if you will, is it mentioned that very high temperatures are the enemy of the cladding in the canister, et cetera. Is there any standard requirement today on the thermal loading that is allowed to go into a dry cask storage system? And are you perhaps looking at the need to maybe extend the wet cooling longer in order to reduce the thermal loading on the canisters, since we are going much longer term than originally thought?

DR. RUBENSTONE: There are limits, maximum

temperature limits now for loading. And in some sense, yes, very high temperatures are the enemy. But it is not just high temperatures that you have to worry about. As you go to longer terms, things cool down and there are some issues that can arise at lower temperatures as well.

Part of the loading issue has to do with the burnup of the fuel. Lower burnup fuels cool off sooner, basically, in wet storage compared to high burnup fuels to reach the same thermal output. Utilities now I believe balance, as they load canisters, mix older, colder fuel with some younger, warmer fuel to keep the thermal limits -- temperature limits for the interior of the canister.

Some of the issues that have come up with the cladding, which we are still looking into, are the potential for some brittle ductile -- or ductile to brittle transitions even at lower temperatures. So when you are looking at for extended storage out over several decades or more, some of the lower temperature issues actually come in.

MS. JANAIRO: Okay. Thank you, Rick. We will go next to Pat Dostie, and then we will go -- we will turn to some of the written questions. And, Tim Runyon, I also have you in the queue. But next we

will go to Pat. Go ahead.

Well, Pat, try again. You're unmuted. All right. We will come back to Pat. We will go to Tim Runyon for his question. Tim, you're on.

All right. We will go to a written question. I have a question from Christopher Amaro, and the question is, "Does the NRC support the idea of one or more consolidated interim dry cask storage sites in the near future, as recommended in the Blue Ribbon Commission on America's Nuclear Future draft report?"

DR. RUBENSTONE: The NRC doesn't take positions on those recommendations at this point. One of our goals is to be able to safely regulate any decision that comes forward. I should point out that there has -- NRC did a license review and granted a license to a -- what is effectively a consolidated dry storage facility several years ago, which has not been exercised yet, but the licensing action was part of the record and the license exists. This is the private fuel storage site that was proposed in Utah.

So we do have a process whereby we think we can review and reach a decision on a consolidated facility, but whether this exists is a matter of policy --

MS. JANAIRO: Okay. We will try again to go to our two people who have their hands raised. I don't know if it's a problem with the voice over IP or what, but we will try again. Patrick Dostie from Maine? Pat, if you're asking a question, no one can hear you. It must be your microphone. Try typing your question instead.

We will try Tim Runyon. Tim, you're on.

MR. RUNYON: I'm typing.

MS. JANAIRO: I can hear you.

MR. RUNYON: Can you?

MS. JANAIRO: Yes. You can try your audio instead.

MR. RUNYON: Oh, okay. You can hear me now?

MS. JANAIRO: Yes. Go ahead.

MR. RUNYON: Okay. I'm wondering about a lot seems -- a lot of emphasis seems to be put on cladding performance, and, you know, cladding performance is something that we don't have a lot of information on.

I know that even for fuel stored at the Zion plant here in Illinois the cladding was all right, but the fuel baskets and the bundles themselves had to be reinforced before they could be moved

around.

I'm wondering, you know, about the wisdom of trying to evaluate cladding inside a container 120 to 300 years down the road. And if we are not going to get ourselves, you know, immediately back into the quagmire of no evidence of our study showed this and your study showed that, if there isn't -- you know, inside a closed container that's -- to me, it is like a faith-based initiative or something, because, you know, you are not really going to have a way of evaluating it. Why wouldn't we look at some things different or evaluate the outside container instead? Focus on that.

DR. RUBENSTONE: Yeah. I'm sorry if I gave the impression that cladding is the only thing we are looking at. It is just one of several things, and certainly the canister itself and the behavior of that is very important.

But we do think that we can get some insights from some laboratory work and other studies on the behavior of cladding over the long term. And the key in that is understanding the physical state of it.

There are issues about hydrides which form during irradiation and how they -- and they reran it,

and then how those behave over a different temperature range, from the very high temperatures in the reactor down through the initial out-of-reactor temperatures, and then as they cool down.

So I agree that it is challenging. I agree that there are a number of issues that we need to pursue in parallel. And certainly the cladding is one, the performance of the container -- the canister is very important, and then other aspects, like you say, things like the fuel baskets, the assembly structures, neutron absorbers, other shielding materials. We are not eliminating any of them. I just tried to give a couple of examples.

MS. JANAIRO: Tim, did you have a followup?

MR. RUNYON: No, I'm still trying to figure out how you can hear me.

(Laughter.)

MS. JANAIRO: Rest assured, we can. Okay. I'm putting you back on mute.

Let's try Patrick Dostie one more time. Patrick, go ahead, please.

Well, that's not working. So, Pat, if you have a question, please type it in the questions pane.

If anyone else has questions, please

either raise your hand or type your question in the questions pane. It is okay to ask questions about today's topic, but also, if you were a participant in yesterday's webinar on waste confidence, there is -- we can raise a question on that topic, if something has come up.

I see Jane Beetem has raised her hand. So, Jane, we will go to you. Jane, I don't know if you have a microphone on your computer, but you are using voice over IP, so you need to make sure that your sound settings include a microphone. If you don't have that setup, go ahead and type your question and we will read it for everybody.

Want to try again? Okay. Jane, go ahead and type your question and we will take it that way.

I had a question about -- well, I guess this could go for either waste confidence or extended storage. It seems to me that the communities that have the nuclear plants will take a big interest in this. One of the themes that came up quite often at the Blue Ribbon Commission workshop we had here in the midwest was that the powerplant communities are happy to have the operating powerplants. But after it shuts down and they are left with the spent fuel for perhaps generations, it is no longer such an advantage in the

community.

So I'm wondering, to what extent will the NRC reach out specifically to these powerplant communities to get stakeholder inputs? And also, on the subject of extended storage, will anything be done to look at the specific conditions at each plant? And I'm thinking along the lines of the difference between, for instance, extended storage in Arizona versus extended storage at one of the many plants that are located on the shores of the Great Lakes.

DR. RUBENSTONE: Yeah, I can answer that I think, Lisa. Certainly, the decommissioned plant sites have unique challenges, not the least of which is that once you have proceeded through decommissioning, if there is still onsite storage, that part of the site can't be released because of the security considerations and the safety concerns. And I think those communities would prefer to have the site available.

There are also issues regarding the amount of facilities that are still available for handling fuel at a fully decommissioned site. There is not a lot of infrastructure that is available besides to load the fuel for transportation. So those are in fact, yes, several unique aspects, and we recognize

that we need to address those specifically. And we will be doing our best to reach out to those sites as well.

There are a number of existing ones, and certainly as time goes forward there will be additional decommissioned sites that need consideration.

The second question was the differences of the various sites. There is two ways we are looking at that. On the extended storage question, from the technical aspect, there are certainly very site-specific things we need to worry about. Under the current framework, each site gets its individual review, and they have to deal with their specific local conditions.

One example is different parts of the country have different levels of seismic risk. Certainly, the analysis that is done for these interdependent spent fuel storage installations, say on the west coast, are different than the seismic analyses that are done in other parts of the country, although we did prove recently that there are parts of the country that, even though they don't have frequent earthquakes, they still have earthquakes.

From the technical point of view, on

extended storage there are a couple of issues that have come up, especially on the canister aging -- material aging issues of the canister. There are some conditions that can arise in salt water environments near sea coasts, and where deposition of salt on the canister may lead to different corrosion mechanisms that need to be examined in detail.

We are looking at that specifically, others. In more industrial areas, the air pollution effects have to be considered. And certainly climate effects in general, like you said, you difference between Arizona and, say, Great Lakes or Florida in terms of just general climatic impacts. So we are looking at these sites specifically.

As Christine discussed yesterday in the waste confidence, as we go forward trying to generate an environmental impact statement to support the waste confidence decision -- and we will be doing some generalized analyses, but we have a number of scenarios and composite sites that we are putting together to make sure that we capture the environmental impacts, not necessarily at every single individual site, but sort of groups of sites.

So we will be considering, you know, coastal sites versus inland sites, what sort of

different impacts they might have, sites in highly populated areas, relatively highly populated areas as opposed to less highly populated areas.

Another way the impacts may be different, sites that are, you know, close to transportation networks as opposed to distant from transportation networks. So we will be doing a number of scenarios and a number of variations within those scenarios to try to capture the full range of environmental impacts.

MS. JANAIRO: Okay. Thank you. I have a written question from Jane Beetem from Missouri. Her question is, "The photos showed the cladding decay, but how does NRC propose to place a camera or similar device in a canister that will be able to document cladding conditions over the very long term without replacing the camera battery? It seems that opening the canister to replace the battery may not be the best option."

DR. RUBENSTONE: I would agree that opening a canister to replace the battery is not a good option. There is a couple of things we can do. One example -- there already is a demonstration cask of fuel that was in storage for about 12 years and was opened and examined in some detail the materials

inside. And that was opened about 10 years ago and essentially showed no change in the condition.

So samples were taken; they were analyzed in the laboratory. That canister was closed up again, and it is still sitting. And it may be reopened again as part of a demonstration program.

There are plans by the Department of Energy, which are just now coming together, to set up another cask demonstration program where there would be a heavily instrumented and monitored cask with higher burnup fuels set up that then could be periodically reopened and examined as we go forward.

Those photos that we showed of the cladding are not the kind of photos one would get if they just looked at the assemblies within the canister. Those are lab photos from experiments that were done and then taken apart to look at the details of how the cladding behaves. So we will be doing additional experimental work, by NRC, by Department of Energy, and other groups to examine things under specific conditions that we expect to happen within the canister.

There are monitoring techniques that we are looking at. Some of them are remote sensing type, actually, that may give you some idea of how the

material is behaving within the canister, although these are pretty challenging conditions to monitor under. And these techniques are in the development stage, but I know that DOE is working on that specifically and we are looking at that as well.

So, yes, opening a canister is not a small exercise. You need specific facilities in order to do that, but we are trying to set it up so that we get the best information we can in order to have a strong, equitable basis for any regulatory decision.

MS. JANAIRO: Okay. We have another written question, and then we will go to the folks who have their hands raised. I'm sorry, Chris, was that you?

MR. JACOBS: Yeah. Lisa, one other thing. I don't -- I think I heard also about the decay rate inside the canisters and the energy produced inside the canister possibly being looked at to produce the energy to power the camera inside the canister. So that is something else that is also a possibility down the road, or recharging the battery or whatever, where you wouldn't have to open the canister up.

DR. RUBENSTONE: There are a number of things examined. And, again, a canister -- a camera by itself is not necessarily within the canister

exactly what you are looking for. The key things that we want to get the information on, and some things -- we have models that can tell us about -- the temperatures within the canister at various stages and on the outside of the canister, the behavior of the cladding.

Again, some of these things you can't -- you can't really tell just by visual examination. So it's important to be able to have laboratory experiments or analog studies that can give you some information on how these things behave over time.

And as I said, the behavior of the cladding, in particular in high burnup fuel, is of high interest because how it behaves at higher temperatures and how that ages down to lower temperatures is particularly important to keep the integrity over long periods of storage and through transportation.

MS. JANAIRO: Okay. The next written question we have comes from Sandra Threatt in South Carolina. "With an upcoming public information meeting for a new reactor site in our state, can we expect NRC to address extended storage issues at this and other new reactor sites?"

DR. RUBENSTONE: I can't commit that we

will have full discussions of extended storage at the new reactor siting meetings. I can make an effort to make sure that the people there are aware of the issues and can bring that up.

Part of the purpose of the waste confidence decision is to keep the storage and backfit issues dealt with on this -- in this framework as opposed to revisiting generic issues at each reactor site. I can understand the concern of the community that when you are buying into a new reactor you are buying into the whole package of everything that goes with it.

Certainly, I would -- as I said, I will make sure that, from my point of view, the people who are attending those meetings from the NRC are aware that these concerns exist, and that they -- you know, they can draw on what we are doing within the extended storage and transportation program to help inform the communities.

MS. JANAIRO: Okay. And Jane or Sandra, if you have a followup to your questions, go ahead and type those.

In the meantime, we will go back to Rick Moore. Rick?

MR. MOORE: Yes, thank you. A number of

years ago, like decades ago, NRC prepared a report that is euphemistically called the "Modal Study." It had a NUREG number. I don't remember what it was. But at any rate, that study was basically used to analyze the impacts of the system on transportation to a severe accident and reached the conclusion that both criticality and containment were adequate for the cask systems that they evaluated in that study.

And then, recently the NRC has been looking at the possibility of performing a formal study. I'm wondering if -- first, if there is any thought about going back and revisiting the modal study and reevaluating the response that was predicted from that work based on cladding and canisters and baskets, et cetera, that have perhaps degraded over time because of the extended storage.

And then, the second part of the question is, if you look at the package performance study in the future, would you consider looking at the material that is degraded because of extended storage as part of that study?

DR. RUBENSTONE: I think those are both good suggestions. We are looking at, within the broader transportation initiative, as part of this extended storage and transportation, the question of

how potentially degraded older materials are going to behave in transportation accidents.

And the study that you referred to I think was the nominal accident scenario and the behavior of the canister or cask system to withstand a nominal nine-meter drop I think, and behavior of the cladding in that condition.

So, yes, we will be including that as part of our work -- the conditions that could happen during normal transportation and during the transportation accidents as far as how that -- how the older, potentially degraded from aging material will behave in that.

And, yes, the two key things in any accident analysis for transport of spent fuel are containment and prevention of criticality events.

The package performance study has been discussed for some years. And as that evolves, I don't think it is in -- there is a specific date or experimental design in hand right now. But including aspects of degraded materials I think is important, if that goes forward or when it goes forward.

So, yeah, I think we are on -- we are keeping in mind all of these issues. And, yes, the -- our previous work on storage would need to be relooked

at in case any of the material properties have in fact gone downhill.

MS. JANAIRO: Okay. Rick, do you have a followup?

MR. MOORE: Yeah, a quick followup. If you look at those issues, would you consider having to look at the regulatory framework for licensing cask systems, given what you find, i.e. the drop test, the fire test, emergency test, whether those accurately -- or would still be adequate to evaluate a new cask system with potentially degraded canister assemblies, baskets, et cetera?

DR. RUBENSTONE: Yes, that's exactly what we would be doing. And the regulatory framework -- once we have the technical bases, make sure that the regulatory framework adequately captures it.

It was just pointed out to me by some of -- one of my colleagues here that that is NUREG-6672 is the modal study, and that it, yes, in fact is being looked at right now for update.

So, yes, you need to make sure that the regulatory -- current regulatory framework, any changes that you would want to make can be accommodated, and we have the technical basis for that.

MR. MOORE: Thank you.

MS. JANAIRO: Thank you, Rick.

Okay. We will turn to Ralph Best now to ask your question.

MR. BEST: Hi. Can you hear me, Lisa?

MS. JANAIRO: Yes, we can.

MR. BEST: Okay, good. My question -- I wrote my question, but the question has to do with the confidence -- the waste confidence investigations that will be ongoing and whether or not those investigations will consider loss of institutional controls as one of the future scenarios.

DR. RUBENSTONE: I am going to ask Christine Pineda, who is our project manager for the waste confidence, if she can answer that for you. She is just getting online here.

MS. PINEDA: Okay. I just need to unmute myself there.

Okay. I'm not sure if you were in attendance at yesterday's webinar, but one of the main assumptions we have for the environmental impact statement for the long-term waste confidence update is the maintenance of -- or the continued regulatory infrastructure or regulatory program that storage of spent nuclear fuel and high-level waste would continue

under a fully regulated program similar to the program that we have today. And that any developments that are needed down the road to accommodate aging phenomena or other issues would be incorporated into the regulatory structure.

And we -- the term "institutional controls" I think is used more in the context of a disposal site where you develop a disposal site and place the waste, and then there is a period of time where there is a certain amount of monitoring, and then at some point the site is -- there is no more monitoring, and so then there is -- it is the end of that period.

But this isn't the same -- this -- we are not assuming this would be the same situation. We are assuming it is storage, just as it is today. So we are not looking at a total loss. For example, DOE in their Yucca Mountain analysis looked at a loss of institutional control -- of institutional controls, and we are not looking at that.

MS. JANAIRO: Ralph, do you have a followup?

MR. BEST: Well, I was going to mention that the Yucca Mountain EIS did consider the no-action alternatives in which ultimately institutional

controls might be lost, and evaluated the impacts of losses of those controls.

That would help I think in some way to address the question Cort Richardson asked yesterday about whether or not the actions to investigate waste confidence and, in essence, might create a situation where there is sufficient confidence to take no action as far as long-term disposal.

So the alternative of course is to investigate what actions -- what consequences might arise if there were, over the long term, a loss of institutional controls as a way to help to emphasize the importance of disposal action.

MS. PINEDA: Well, just to clarify regarding the EIS. The no-action alternative for the NRC for this EIS, because the EIS is for a long-term update of the waste confidence rule, so the no-action alternative is not to update the rule.

And so what we are doing is we have four storage scenarios that we are proposing to analyze the impacts for extended storage, but we are not proposing any of those actions.

Our proposed action is really -- is to update the rule, if our EIS analysis shows that we can, for example, make a statement that spent fuel or

high-level waste can be stored beyond -- you know, for some period beyond the current 60 years past license life. So that is what our proposed action/no-action alternatives would be.

Also, I think for -- this situation is different from Yucca Mountain in that we are -- we are looking at a limited -- although it is extended storage, it is a limited period that we are looking at -- a couple hundred years versus I think DOE's analysis -- they had two different -- or two different sub-analysis I guess -- analyses of the -- their no-action alternative of just leaving it in place. And literally they just left it there, and it was parallel to their analysis of disposal in a repository.

So I think it went out to like a million years or something. And we are just not looking at that kind of timeframe, and I think -- and we have made the assumption that controls would be -- would remain in place for the couple of hundred years that we are looking at.

MS. JANAIRO: Ralph, did you have anything more to add to that?

MR. BEST: I think we have discussed it sufficiently. I understood -- I do understand that the EIS the NRC would prepare, the no-action would be

the action of not changing the regulation. So, but I just wanted to raise the issue, since we are discussing long term, and far into the future where no one can really know whether other situations were being considered.

I think we have addressed it. Thank you.

MS. JANAIRO: That was a good point, and thank you for raising that.

Christine, I was going to ask if you would be able to pull up your slides from yesterday to show what the four possible actions are that you are considering.

And in the meantime, while you are doing that, I will read a question -- a followup from Jane Beetem, so that she can get an answer. "How would you estimate the amount of time NRC plans to spend on studying the cladding compared to the amount of time to be spent on studying the ability of the canister to contain radioactivity should the cladding fail in some manner?"

DR. RUBENSTONE: I don't know if I can give an estimate as to how much effort we are going to put in each area. I know that, as our report is developing, canister issues have risen to the top of the list of things that we want to start working on

right off.

There are cladding-related issues that are in that category, mostly related to behavior of high burnup fuel. So I can't tell you that one is so many hours and another is so many other hours. They are both in the high interest category, along with a couple of other areas which have come out. And I don't have the details of that report right in front of me, but that will be coming out as a report for comment very soon.

And NRC of course is going to put our resources into place where we think we can get the most efficient return on what we need to do. And we are not ready to -- we are certainly not going to change regulations if we don't feel we have a strong technical basis for how we are going forward.

MS. JANAIRO: Okay. Thank you.

And thank you, Christine, for putting your slide up. I had a question -- and I apologize if you addressed this yesterday, Christine -- but is the NRC going to be looking at the relative cost of each of these scenarios as well as safety implications?

MS. PINEDA: We are going to be looking at the costs of long-term storage. It is not going to be a very detailed type of cost-benefit analysis, but we

are going to be -- costs are one of the impacts, and we are going to be doing a general assessment of the costs of long-term storage.

So, for example, one thing I mentioned yesterday is if you look at spent fuel or waste being stored for a couple hundred years on a pad, at what point might you need to repackage that fuel? Or would you need to? And, if so, how often?

And of course that really factors into -- that really affects the costs. And other things that affect the cost is just the -- is the ongoing monitoring and the maintenance, the yearly maintenance costs, and also I think security would affect costs.

So we are also going to be looking at costs to a certain degree, but we are not doing a highly detailed cost analysis.

MS. JANAIRO: Okay. Thank you.

If anyone else has questions, please either type them in the questions pane -- oh, I see -- I see one. Here is a question from Jay Jones. "Can you elaborate on the extended storage collaboration project, an effort sponsored by the Electric Power Research Institute, that is being currently conducted with international partners?"

I'm sorry, Jim. Can you go again, please?

DR. RUBENSTONE: Yes, I just need to get unmuted. I can say a few words about that. That is being organized by, as you said, EPRI, the Electric Power Research Institute. It is a collaboration that involves industry in the U.S., the Department of Energy, EPRI.

NRC is involved as -- to provide input for what the areas of concern are, and international partners, which include informally a number of national programs, and some interest by the International Atomic Energy Agency, which has several programs going on extended storage issues.

The goal of this is to coordinate individual efforts to make sure that we don't duplicate or miss areas. EPRI has issued a couple of reports on that project including their technical issues report.

It -- all I can really say about it is that it is a good effort to keep industry focused on the areas that they need to be focused on and encourage people to work together to share data and information, so that we get the technical information as efficiently and effectively as we can.

Can I -- is there more you need to know at this stage? It is just getting going.

MS. JANAIRO: Jay has a followup. Go ahead and type that, Jay, or we can try -- we can try having you unmute your line. Raise your hand if you'd like me to do that.

I will follow up -- and this may be related -- Jim, you had mentioned that DOE was conducting or planning to conduct another cask demonstration project, and I don't mean to put you on the spot to answer questions about another agency's activities, but can you share a little bit more information on that?

And perhaps if there is someone from the Department of Energy with knowledge of that program, please raise your hand, so we can unmute you and you can share what information you have.

DR. RUBENSTONE: Yeah, I would certainly defer to any DOE person who is on the line to do it. My understanding is that this is still in the early planning stages. DOE had been part of the effort -- as I said, the earlier demonstration project, which NRC was involved in about 10 years ago, was opening canisters or casks which were stored at the Idaho National Laboratory, which is a DOE facility in Idaho.

And DOE has indicated that they would be -- they are looking at planning and potentially

supporting a similar demonstration project again focused on high burnup fuel, which is one of the major question areas going forward on how, if at all, high burnup fuel would behave differently than the low burnup fuels that were in the first demo project.

It is still within the planning stages, and I don't think they have made any decisions. They need to develop better defined goals and what sorts of information we would try to gain from that, what sorts of instrumentation could be added to the projects.

There are some regulatory concerns about where it would take place, how the fuel would be loaded, where it would come from, etcetera. So there is a number of details that need to be worked out on this, so we are still a few years away from getting going on it. But they have expressed interest in potentially supporting this, given -- if the resources are available and they see as a relatively high priority item for them.

And, again, if anyone from DOE is on the line and wants to help out, I am glad to yield to them.

MS. JANAIRO: Well, I don't see anyone raising a hand, but perhaps they will soon.

Does anyone have any other questions about

either today's topic, extended storage, or the topic of yesterday's webinar which was waste confidence? Oh, I see -- I do see Steve O'Connor raising a hand. Steve, you need to type in the audio PIN that I just sent you.

Okay. Never mind, Steve. Steve has relayed a question through the questions panel. He does not have a microphone on his computer. So he says, "The Office of Nuclear Energy has the lead. We are providing support as needed."

I don't know if we have anybody from DOE's Office of Nuclear Energy on the line. If we do, please raise your hand now.

And last call for any questions from any of the participants on today's webinar before we turn it back over to Chris Jacobs to wrap us up.

(No response.)

All right. Chris, we will go back to you.

MR. JACOBS: Okay. Well, thank you, Lisa. Actually, I am going to give it over to Jim to wrap up for today's session.

DR. RUBENSTONE: Thanks, Chris. And thanks to all of the participants, and to Lisa and The Council of State Governments for sponsoring this.

I would just like to wrap up -- to

summarize some of the questions we got. I think there were a number of very good questions -- questions regarding integration of transportation and storage and concerns about existing canisters and their ability to be transported without additional fuel handling, concerns about temperature limits and how those are used in determining how we load, consideration of the emphasis on the cladding performance. And I hope I cleared that up, that we are -- cladding is just one of the many areas we are looking at. Canister performance is important.

Concerns about how one could monitor inside a closed canister, which I agree is a challenge. Potential for a consolidated dry storage site -- that came from the BRC Commission.

I should just note that we are carefully following the draft recommendations and the final recommendations from the Blue Ribbon Commission, which will be coming out I think in January -- their final report. And NRC is looking at how that might affect our programs.

Questions about extended storage at new reactor sites, about revisiting the modal study on transportation accidents, NUREG-6672, a question about the waste confidence, and some of the assumptions

within that and what the no-action alternative would be. Again, cladding in the canister and a little bit of discussion about the EPRI-led collaborative program and the cask demonstration project.

So we got a very good discussion. And, again, thanks to everyone. I hope you found this webinar format useful, and I hope that you continue to stay involved with us as we move forward.

Again, anyone who registered for this webinar, we have your email address and we will add you to our mailing list. And you should be getting an email in the near future from our new email outreach system for both waste confidence and the extended storage and transportation program. So we would appreciate it if you would use those, and we are going to use those as our main way to reach out to people.

As noted yesterday, we may in fact be doing another webinar with Lisa, potentially in late January when the waste confidence paper is out, in the public comment period to walk people through that, if that would -- is seen as something that would be beneficial.

So, again, thanks to everyone who participated. Thanks to our hosts. And we will see you on the next webinar or public meeting.

MS. JANAIRO: Thank you, everyone. This concludes our webinar. Have a great week.

(Whereupon, the webinar was concluded.)