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NUCLEAR REGULATORY COMMISSION

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570TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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FRIDAY,

MARCH 5, 2010

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ROCKVILLE, MARYLAND

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The Advisory Committee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:30 a.m., Said I. Abdel-Khalik, Chairman, presiding.

COMMITTEE MEMBERS:

SAID I. ABDEL-KHALIK, Chairman

J. SAM ARMIJO, Vice Chairman

JOHN W. STETKAR, Member-at-Large

GEORGE E. APOSTOLAKIS, Member

SANJOY BANERJEE, Member

DENNIS C. BLEY, Member

MARIO V. BONACA, Member

CHARLES H. BROWN, JR., Member

COMMITTEE MEMBERS: (cont.)

MICHAEL L. CORRADINI, Member

DANA A. POWERS, Member

HAROLD B. RAY, Member

MICHAEL T. RYAN, Member

WILLIAM J. SHACK, Member

JOHN D. SIEBER, Member

ACRS STAFF PRESENT:

EDWIN M. HACKETT, Executive Director

ZENA ABDULLAHI

CHRISTINA ANTONESCU

MAITRI BANERJEE

KATHY WEAVER

T-A-B-L-E O-F C-O-N-T-E-N-T-S

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Adjourn

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

8:30 a.m.

CHAIRMAN ABDEL-KHALIK: The meeting will now come to order.

This is the second day of the 570th Meeting of the Advisory Committee On Reactor Safeguards. During today's meeting, the Committee will consider the following: Digital Instrumentation and Control Design Acceptance Criteria Inspection Methodology; New Advanced Reactor Designs; Meeting with the NRC Executive Director for Operations; Future ACRS Activities and Report of the Planning and Procedures Subcommittee; Reconciliation of ACRS Comments and Recommendations; and Preparation of ACRS Reports.

The meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Ms. Christiana Antonescu is the Designated Federal Official for the initial portion of the meeting.

We have received no written comments or requests for time to make oral statements from members of the public regarding today's sessions. Westinghouse staff members will be on a phone bridge line listening to the discussion on digital

instrumentation and control design acceptance criteria inspection methodology. To preclude interruption of the meeting, the phone will be placed in a listen only mode during the presentations and committee discussions.

A transcript of portions of the meeting is being kept and it's requested that the speakers use one of the microphones, identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

Mr. Bley will lead us through the discussions of the first item on the agenda for today.

MEMBER BLEY: Thank you, Mr. Chairman.

We're beginning with the discussion of the Digital I&C Design Acceptance Criteria and this follows up last fall's, I think in November, initiation of the task working group and a part of the staff to look at how DAC closure following a COL would progress. And the folks on staff will know that the Committee is quite interested in this topic.

We had a little discussion on this area and the human factors engineering side earlier this week in the ABWR Subcommittee. This is an information briefing and we're looking forward to hearing how the work's progressing and what we expect in the future.

At this time, I turn it over to Tom Fredette on staff.

MR. FREDETTE: Thank you, Mr. Bley. My name is Thomas Fredette. I'm an Operations Engineer in the Construction, Assessment, Enforcement and Allegations Branch, Division of Construction, Inspections and Operational Programs, Office of New Reactors.

As Mr. Bley mentioned, this is an informational brief for the Committee. We wanted to continue the dialogue that was set forth in 2009 regarding the staff's planning for an approach to the issue of design acceptance criteria in the current crop of DCDs and COL applications and the actions that the staff has taken to address that issue. I'm also the Designated Lead for the Design Acceptance Criteria or DAC Resolution Working Group which was commissioned or chartered back in November of 2009.

Some objectives for this meeting. We want to provide the Committee basically some details of our DAC inspection methodology. We want to provide a little overview of our approach and plan for conducting a pilot DAC inspection in conjunction with South Texas Project Units 3 & 4 design. And I'll provide a little brief summary of some long-term goals

that we envision for integrating the lessons learned that we gained from the DAC inspection process with the ITAAC Closure process.

A little background. In mid-2009, the staff was initiating some inspection framework for what we call complex ITAAC or DAC. These are ITAAC that generally are not seen until the end. They're generally not ITAAC that involve as-built verification or testing in the field. These are ITAAC that involve review of detailed technical reports.

As we were developing that framework at about this same time, South Texas project requested in a letter in June 2009 a staff review or audit of some of their early digital I&C design elements. These were high level planning reports, things like that.

As a result of that letter, the staff decided to commence a pilot effort to address the South Texas project request. And that's basically what led to the development of the DAC Resolution Working Group.

The benefit of a pilot effort. We felt that it would allow the staff to gain some confidence in the early stage in the South Texas project digital I&C design. It will help inform our envisioned DAC inspection process which will ultimately enable us to

optimize our resources for future DAC inspection.

Just a little overview of the DAC Working Group.

MEMBER APOSTOLAKIS: What is the benefit for South Texas? Why did they initiate it?

MR. FREDETTE: Our understanding is that they had some early design products that were going to be related to their overall digital I&C design and they were looking for some review of those products basically to gain some confidence that they were on the right track.

MEMBER APOSTOLAKIS: Okay.

MEMBER CORRADINI: If I may. I'm looking ahead. Is somewhere in this are we going to see like, not a time line, at least a process line as to when this appears relative to certification and to fuel load?

MR. FREDETTE: Not really.

MEMBER CORRADINI: Is that eventually going to be part of the working group? Because at least with another certification some of the Committee members on my subcommittee have angst about timing relative to certification and where in the COLA this occurs. So I guess I assume this kind of trial will help clarify that.

MR. FREDETTE: Yes, it should, Mr. Corradini. As we envision it, most digital I&C DAC inspection will be conducted deep into the construction phase.

MEMBER CORRADINI: And the question we are and we can hold off and let you continue is how deep. That is that's where I think the uncertainty seems to be.

MR. TANEJA: I can speak from the --

MEMBER CORRADINI: If you're going to get into it later, that's fine.

MR. TANEJA: I can speak from the site --

MR. FRYE: If I can jump in. I'm sorry, Dinesh. My name is Tim Frye. I'm the Chief of the Construction Assessment Branch and Tom works for me.

I don't know that we're actually going to get into that because the purpose of this brief is really to discuss our strategy for DAC inspection.

MEMBER CORRADINI: Whenever it occurs.

MR. FRYE: Whenever it occurs. Now the decision when that occurs is a separate topic that we're not really covering.

MEMBER CORRADINI: That's fine. I just wanted to bring it up because I think to the extent that at least for the ESBWR I'm looking -- the

Committee members can tell me if I'm misinterpreting -- where the concern was wasn't that staff, once we understood the process, wasn't going to do the process appropriately. It's when it would occur and could we have a chance to look at it and comment on it in some fashion. That was part of our concern. I'm looking at Dennis. Am I misinterpreting?

MEMBER BROWN: Can I make an observation?

MEMBER CORRADINI: I just want to make sure. Do I have --

MEMBER BLEY: Yes, that was part of our concern.

MEMBER BROWN: One of the issues we brought up on emphasizing the ESBWR in the meeting, the earlier meeting, was with the DAC there are two aspects to the DAC/ITAAC or ITAAC/DAC, however you want to phrase it. There are the design attributes that you're supposed to meet when you're designing the equipment or to design the functionality and everything that you establish in development. Whether it's hardware, software, it doesn't make any difference but that you're going to use to construct, manufacture and test to make sure it meets its performance requirements.

Then there's the ITAAC part, the

inspection. The installation doesn't get hooked up right or the wires connected to this, all that type of stuff. Do the switches operate with the other integrated systems in the plant? All those other. So there are two aspects to it.

Obviously, one part will be done deep into the construction phase when you've installed the equipment and you're running your integrated test program at the site. The design phase where you prove that you've got independence, redundancy, determinacy. You meet EMI requirements, environmental requirements, all that. That's done early. Somebody has to look at that.

And the question in my mind was who looks at that and when. And if it's done too late, then that's a problem.

MR. FRYE: Right.

MEMBER BROWN: I'm not saying you have to define that now. I'm just saying --

MR. FRYE: I'll let -- I'll give it back to Tom and Dinesh in a second. But I just wanted to make sure everyone understands that I think the first question is really a licensing question, you know, how DAC is being used in the licensing process and this is really an inspection brief. This is a briefing on the

inspection that we're developing to review the licensee's closeout of DAC. And I think you're really in the licensing area. So we had not planned to cover that.

MEMBER CORRADINI: That's fine. But I'll say it one last time which is okay, it doesn't fit here. But unless we understand where it fits, we're not going to stop asking questions.

MEMBER-AT-LARGE STETKAR: I think the problem is that when we talk to as you characterize it the licensing folks they say --

MEMBER CORRADINI: They throw it to you.

MEMBER-AT-LARGE STETKAR: -- it's in your responsibility to perform that design review. That's why you're here and if you're saying it's their responsibility, now we're getting that's back where we came from.

MEMBER APOSTOLAKIS: That's exactly the problem.

MR. WILSON: This is Jerry Wilson. I'll speak for Licensing.

(Laughter.)

MEMBER CORRADINI: I knew you were there for something.

MR. WILSON: Remember. We have addressed

this in the past. I'll just restate our basic position we've taken on this. There's really three main opportunities where we see DAC being resolved. One is during the design certification, more specifically an amendment to design certification. And you're seeing some of that in the amendment review for AP1000.

MEMBER CORRADINI: Right.

MR. WILSON: Another opportunity is during the combined license review. The last opportunity is during the construction phase. Timing as to when is a choice made by the applicant or licensee. We're not controlling this. The NRC is encouraging applicants and licensees to do it as soon as possible. We see that the later you do it the more problems or more difficulty there's going to be.

So that's where we're at. But the choice is the applicant's or licensee's choice as to exactly when they submit that documentation.

MEMBER-AT-LARGE STETKAR: We recognize that opportunity. I will give you specific example in the North Anna COLA process in which case the DAC are not being resolved at all with respect to digital I&C at the DCD. There is simply very high level functional programs.

And the COL applicant has directly passed through all of that. There will be no addressed DAC on digital I&C at the COL phase. So it's a complete pass-through. And that's a real example that's on our table right now.

So it's not a hypothetical opportunity situation. It's not a revision of an AP1000 design certification. It's a real world/real time situation that we're facing.

MEMBER CORRADINI: So just to emphasize because I think John said it perfectly. So what I hear from you, Jerry -- and it's not the topic of this thing, so I'll stop with this point -- is if we come to a certification of ESBWR we have to have faith -- at least I have to have faith -- that downstream it's going to be done early enough that we can understand it and comment on it so that when I come to a certification of a particular design we either pass it through saying, "Yes, we have faith" or what?

MEMBER APOSTOLAKIS: Coming back to the North Anna example, is there still a distinction between licensing and inspection now?

MEMBER-AT-LARGE STETKAR: Essentially no because there will be no review, there will be no closeout, of those DAC except by the inspection folks.

MEMBER APOSTOLAKIS: That's exactly the point so?

MEMBER CORRADINI: But I think Jerry's answer. I understand Jerry's answer -- at least I thought it did -- which is --

MEMBER APOSTOLAKIS: Well, let him explain it again.

MEMBER CORRADINI: I thought you said -- What I heard you say in the three possibilities is that if staff thinks they've done enough on a high level phase of the certification staff will say, "Okay. You take the risk. This is good enough for certification. It will either be at COL stage or an inspection stage."

And we're saying "Well, even we're going to say it's not good enough because it's too vague and you've allowed other vague" -- I'll just put it on the record -- "You've allowed other vague certifications like this and you're hoping to catch it later." And this is a new group of people that worry about vague.

MEMBER-AT-LARGE STETKAR: And later is now is the point.

MEMBER CORRADINI: Yes.

MEMBER-AT-LARGE STETKAR: It's not ABWR in the mid-90s. It's North Anna COLA today.

MR. WILSON: Can I respond to Dr. Apostolakis?

CHAIRMAN ABDEL-KHALIK: Let Jerry speak.

MR. WILSON: From a licensing perspective, the creation/resolution of the DAC which are a special kind of ITAAC is the resolution at the design certification stage, Commission or future Commissioners.

MEMBER APOSTOLAKIS: Right.

MR. WILSON: As a matter of policy allowed certain design information to be resolved via DAC. So from a licensing perspective the creation of that DAC is the resolution for the design certification stage. Because it's a special kind of ITAAC it doesn't need to be resolved until we get into the construction phase.

MEMBER BROWN: I disagree with that. If I don't have equipment that meets basic design requirements such as independent separation of data communications and stuff like that, you can't wait until construction to resolve that. See if you can get them excited.

MEMBER BLEY: There are three things I'd say and then I'm going to ask you folks to go ahead. You brought up the AP1000 and that's an interesting

case for us because there we actually see many of the DAC being resolved and being reviewed in detail. And that process is generating a fair number of questions as it would have if it had been done in the design certification stage. So we're having some trouble as you can hear coming to grips with how this will, this design will, be addressed how clearing the DAC will ensure the design is adequate and installed properly.

And I guess one thing I hang on words is SECY 92-053 speaks of inspections, tests and analyses to resolve the DAC. And what we hear back are just it's inspection. And to us inspection means something fairly narrow and perhaps to you it means something more broad.

When we were talking about this with the ABWR folks we heard that some of the inspectors in this broader sense will actually be Headquarter staff people who are experts and they're going through at a very thorough level in the review.

We want to hear how that all fits together. I'm going to give it back to you to work through this.

MR. FREDETTE: Mr. Bley, you're correct. I'm mean our strategy, and I'll get into this a little bit more, does involve using the technical staff

experts in the field, not in their field, in the digital I&C field as inspector resources or inspection resources. So you could look at it as first-of-a-kind type of inspection where we're broadening it a little bit, providing a little bit more rigor than just the standard of verifying type.

MEMBER APOSTOLAKIS: But that's an instinct. Is it going to be as rigorous as the evaluation would have been had it occurred during the DCD? I think that's really what worries this Committee. It may be rigorous, but because you know rigor is a broad spectrum of things. So if we do something --

MEMBER POWERS: Rigor is rigor, George.

(Laughter.)

MEMBER APOSTOLAKIS: No, it can mean a little --

MEMBER POWERS: It isn't possible to be half pregnant in this situation.

MEMBER APOSTOLAKIS: No, it is. It is.

MR. FRYE: Tim Frye. I'll take the first and try to respond to that. The inspection is going to be very rigorous. As we mentioned, we're enlisting our Headquarters digital I&C experts to support the inspection. But it is to be clearly understood that

there's a clear distinction between inspection and licensing and as you'll see later in this presentation the inspection that we're doing is in no case meant to replace the licensing activities. The licensing will happen as it's supposed to happen. A licensing decision will be made. The DAC will be improved and we're going to inspect the applicant's, the license holder's, closeout of it.

This is not a licensing activity. This is an inspection and it will be done very rigorous. But it's a different rigor from a licensing activity.

MEMBER RAY: Let me say one thing here just as an outsider to this whole debate. So much of what I've seen and I have read the presentation we're about to air is on can we demonstrate that what we have conforms with the licensing criteria. I'll use that term.

The real question in my mind is can we determine that notwithstanding that it's still unsatisfactory for some reason. And that really goes to the question of what the DAC itself say, how prescriptive, how perfect, they can be.

And I think a lot of the concern among members is can we make the DAC so perfect that you can't produce something that meets the DAC and still

is unacceptable.

That's my take on this. It's not directly responsive to the dialogue you've been having, but it is to the point that we're going to inspect the heck out of this and do a really good job. Well, I'm sure you will. But the question still is is that going to ensure we don't have an unsatisfactory outcome

MEMBER BANERJEE: That is one of the objectives of the inspection.

MEMBER RAY: The inspection can only answer the question does it satisfy the DAC. That's all it can do. That's what you're telling me.

MEMBER BANERJEE: The underlying purpose of the inspection is to ensure that the as-built design conforms with the licensing basis as it conforms with all the regulations. That really is the underlying purpose of the inspection.

MEMBER RAY: You're just reinforcing what I said though. Unless you can write it down in a way that excludes the possibility of something unsatisfactory there's no way the inspection you're talking about here today can do more than say, "Well, it met the licensing basis."

MEMBER BANERJEE: Can you give us a concrete sort of talk problem?

MEMBER RAY: I'll do it this way, Sanjoy. I did spend a lot of my life involved in contracting and to me the DAC are like a contract. I haven't seen any DAC that come even close to being sufficiently detailed to ensure you don't achieve any outcomes that you don't want to achieve or that you would find unacceptable.

But you do get that in contracting and you wind up with big thick documents and the lawyers argue and so on. That would be the only way I would approach it. I can't give you specifics. You would do much better at that than I would, Sanjoy. But I still think the inspection process is inherently limited to saying, "Yes. Well, you met the licensing basis as you wrote it down" and that's all we can do.

MEMBER BLEY: I think at this point I would like to ask Tom to go ahead. The thing we did hear on Tuesday was that that inspection process on the human factors engineering is actually going through the steps of the review that would have been done if it were earlier.

So I want to hear what the inspection is and what the plan is and then we can work from there. So, Tom.

MR. FREDETTE: Okay.

MEMBER BLEY: Back to you.

MR. FREDETTE: Just a little overview of our working group. We were chartered in November to develop the methodology that we could use on a test case basis with South Texas. It's a collaborative effort amongst various divisions and organizations. Jerry Wilson and Dinesh here sitting beside me, they're part of our working group. And we have a region. We've engaged Region II because they do have the lead for ITAAC inspection.

Our primary focus has always been digital I&C DAC. However, just as an aside, the working group did also consist of a human factors expert and a mechanical design expert. So we initiated strategy documents to support subsequent human factors, DAC inspection and pipe stress analysis DAC inspection at a later time.

MEMBER BLEY: Will there be separate guidance for them?

MR. FREDETTE: Separate guidance.

MEMBER BLEY: Okay.

MR. FREDETTE: Yes sir.

And the process that they're going to go through to construct the inspection tools that they need is a little different also.

The charter was later modified to include -- We realized that we don't want to just limit ourselves to developing a pilot methodology. We want to integrate this long term with the overall ITAAC Closure process. It's not integrated now.

The activities we've been engaged in since November were development of a framework, a process framework, that would coordinate the staff expertise that we need to do these types of inspections and the development of some special inspection tools that we're going to need, basically, inspection strategies and a procedure for digital I&C DAC/ITAAC inspection.

The current crop of ITAAC inspection procedures or the current ITAAC inspection procedure for instrumentation and control is not geared toward this type of inspection. So we needed a new tool.

Some considerations that we have deliberated on are the scope and the depth of inspection in this area, recognizing that it's not a licensing review. This is inspection. ITAAC inspection is independent of the licensing decision. And we're focused primarily on the licensee's processes and the Acceptance Criteria that are outlined in the ITAAC.

Our overarching objective is very

verification that the design detail provided will meet the acceptance criteria and thereby conforming with the licensing basis.

One of the specialized tools that we engage in the development of was digital *&C DAC inspection strategies. Basically these are documents that we're developing that support development of a subsequent inspection procedure. They're primarily envisioned to be a planning tool for inspectors to use, just another tool in their arsenal so to speak.

They'll provide all the technical information and insight that the inspector is going to need when he's engaged in the inspection of digital I&C development processes. And they're envisioned to be generic for any DAC inspection in the digital I&C area. They're not licensee specific or application specific or ITAAC specific. They are discipline specific.

MEMBER CORRADINI: So what does that mean? Does that mean that the inspector is -- I mean I'm still trying to understand. So the inspector is sitting there looking at a more detailed analysis of the plant protection system which is a digital I&C system and they're walking through the logical and as they look at it on scene or tested out they make notes

to something. I don't understand what this is.

MR. FREDETTE: It's designed to be a support. Just more technical information that the inspector can use.

MEMBER CORRADINI: As they're doing their inspection.

MR. FREDETTE: Or something that they can research prior to performing the inspection.

MEMBER APOSTOLAKIS: Okay. So this technical information for example will include things like tests or see whether the particular channel is independent of other channels and so on, the stuff like Mr. Brown brings up all the time. Is that what the inspector is going to do?

MR. FREDETTE: No, that's not. No, these are more geared toward the software development life cycle.

MEMBER APOSTOLAKIS: Okay.

MR. FREDETTE: And the development process.

MEMBER APOSTOLAKIS: This particular aspect of independence is actually evaluated during the DCD. Right? During the design certification?

MEMBER BROWN: You can't. There's not enough information.

MEMBER APOSTOLAKIS: But in principle it should be.

MEMBER BROWN: In principle it should be, but that's not what's going on, George.

MEMBER APOSTOLAKIS: And my question is when I reach this stage it seems this is part of the licensing now (Background noise)

MEMBER BROWN: This is not part of the licensing. This is post licensing.

MEMBER APOSTOLAKIS: This is the last step. How can it not be? (Inaudible) that's where we're going. Am I missing here? They are skipping all the steps and they're saying, "Okay. Finally the inspection will do that." Right? Is that correct, John? It's correct.

MEMBER-AT-LARGE STETKAR: That's then our concern.

MEMBER APOSTOLAKIS: Are we going to be asking those questions about independence and diversity? Unless I'm lost here.

MEMBER BROWN: You're not lost.

MEMBER APOSTOLAKIS: So who is going to ask those questions?

MEMBER CORRADINI: To put it differently, (1) they do the inspection. I guess I want to connect

what Jerry said to what you guys are doing. When they're doing the inspection and they're looking through something and they see an attribute that concerns them and it matches the contractual nature, but it doesn't satisfy their warm and fuzzy feeling that it's right, what basis do they have of saying, "Nope, stop, unsatisfactory, go back to square one"?

MEMBER APOSTOLAKIS: The question is whether they will even have this warm and fuzzy feeling.

MEMBER CORRADINI: Or even look at it from that standpoint.

MEMBER-AT-LARGE STETKAR: To even have the charter to what?

MEMBER CORRADINI: I don't know. To bring it up.

MEMBER-AT-LARGE STETKAR: To question whether or not they have a warm and fuzzy feeling in a particular aspect.

MEMBER APOSTOLAKIS: Right. And that comes to the technical information it seems to me. I mean, what is it that they're going to be instructed to do?

MEMBER RAY: Big thick document, George.

MEMBER APOSTOLAKIS: You guys are

confusing me now. Is what I'm saying nonsense?

MEMBER CORRADINI: No, no.

MEMBER APOSTOLAKIS: Oh okay.

MR. JUNG: This is Ian Jung with the Chief of the I&C Branch speaking about this staff decision on this fundamental design principles, GDCs, defense-in-depth, independence and redundancy, staff decisions. I think it's an issue of what level detail the staff makes the decision on.

It's high level when the system description at Tier 1 level all applicants come in with some high level description as well as the process to be followed, typically their commitment to use certain reg. guides or IEEE standards, other methods. If you are talking about that high level, staff can make a decision at that level. Yes, this is a data communication from this and this. We'll follow IEEE 7-3.2. From that level, staff can make a decision on.

But if you're looking to actually see the equipment and verify that, that's the piece that we are generally talking about. I believe that a licensing basis level/design basis level description is sufficient to say they meet it. Whether it's a discretion on have you seen it, have you seen the

equipment, have you seen the platform, specific information to conform, Commission has established a policy using that. And when you have proof of that, I guess as part of the design certification, Commission including ACRS endorsement concluded that there was a reasonable assurance that the facility has been constructed and will be operated in conformity with licensee, the provisions, the Atomic Energy Act as the Commission rules and regulations.

So as part of the design certification ABWR, System 80+, all this design certification we have gone through. The agency, the NRC, made the rule that, yes, this complies with the regulations if these DAC items laid out are followed. Then it will reach the same plant.

But another thing I want to emphasize is the responsibility of following DAC and resolving DAC clearly resides with the COL applicant and holder. So staff's role there is if we are cautioning the ability of the applicant or COL holders to carry out ITAAC or DAC that should have been handled at the licensing stage. And if at this point the capability of the licensee or COL holders to carry out their mission is questionable, that's not something the staff is ready to question that.

CHAIRMAN ABDEL-KHALIK: Can we go back to slide number eight please, the previous slide? I guess the issue that was brought earlier by Mr. Ray. Does verification that the design detail will meet the acceptance criteria will always assure that the design is acceptable? That is the question. Can we write these design acceptance criteria in sufficient specificity and detail so that the outcome of this verification process will always assure that the design is acceptable?

MR. FREDETTE: Well, I think we've seen improvement in how the ITAAC are written in some of the later documents. Like for the ESBWR, the DAC are written very specific. They're very expensive, but they're also very specific not like what we see in the ABWR DAC ITAAC. They're very general, but that's what we have to work with.

CHAIRMAN ABDEL-KHALIK: But that is the heart of the question, right? Given the fact that there's been a wide range of detail and specificity, it means that this verification will not always assure that whatever design that meets the specified acceptance criteria will always be acceptable.

MR. TANEJA: The way I envision this thing is the way the DAC is laid out right now the

acceptance criteria is -- one of the acceptance criteria is complying with a GDC or in the case of I&C would be IEEE 6-0.3 1991. And IEEE 6-0.3 1991 gets very explicit with multiple requirements with separation, qualification, diversity. These are the criteria laid out.

So the way I envision is when you're developing an I&C system design, one of the earlier phases in the requirement phases, those requirements that are in the licensing document need to be captured. And then those requirements become your design basis for that I&C system as long as you're complying with all those requirements.

One of the inspections that we are going to -- we're envisioning on doing is verifying those requirements, adequacy of those requirements, for example. Do they capture all the licensing basis? Do they capture all the regulatory compliance that they're committed to? And then the design naturally the subsequent phases of the life cycle needs to pull the thread on it and verify that they are complying with all the requirements.

MEMBER BROWN: But if that's not written in a doc.

MR. TANEJA: It is written in a doc.

MEMBER BROWN: And the DAC says -- I'll give you an example. The reliability, the fundamental precept of the I&C is to maintain independence between divisions. If you don't have that, you really -- you're not capable or you can't really say that these things are truly redundant because they can be compromised.

And in the old things that have been the spec, IEEE 6-0.3, it states that you have to have electrical isolation and physical separation, mechanical and electrical separation. However, and that's easy to look at in an analog system because you're hooking wires. If you don't hook dead wires with electrical signals going between them, you're pretty clean.

In these new systems, we have data going between processor to processor. It's data communications independence. There's no DAC anywhere in here that says you have to go look at all the ranges of data packages that can be sent and that all the ranges cannot compromise that independence or there's algorithms that are going to ensure that corrupt data cannot compromise that independence because it's sent to every channel. There's no DAC that covers that anywhere.

MR. TANEJA: Mr. Brown.

MEMBER BROWN: Let me finish the point. The point I'm trying to make is that if you look at the DAC whether it's ESBWR, ABWR, run it across the gamut, they're not specific enough to cover that level of detail and there's no -- I mean how does that get captured? I mean I just looked at the ABWR one and it talks about electrical isolation and it talks about physical separation.

MR. TANEJA: There is a commitment made through the licensing basis for compliance with Branch Technical Position 7-14. Those are our staff guidance which we use to inspect digital I&C systems design basis. Okay. So that becomes and that's one of the basis of our tools as using those tools of Chapter 7. It's IEEE 7-4. you know.

MR. FREDETTE: 4.32.

MR. TANEJA: 4.32, 7.14 and that's what these licensees or the applicants are committed to complying with. So those become the requirements. And those become the methods for inspection.

MEMBER BONACA: It seems to imply that just because they're committed to meet the standards they do meet the standards. An identification process is supposed to verify that that commitment is being

met and you're not doing that. It can only verify that they're committed to separate standards in general.

MR. FREDETTE: The tools that we'll use in the inspection space will be the tools that Dinesh just talked about, the criteria that's set forth in the Branch Technical Position or other portions of the Standard Review Plan. We've gathered these acceptance criteria from a lot of different sources. But the Standard Review Plan remains our core resource.

MEMBER BLEY: I think what we need to hear is how you're going to use the subject matter experts at NRC to do exactly what you just said.

MEMBER-AT-LARGE STETKAR: Can I just -- Just to get something in the record, I want to quote something from an SRM regarding SECY 91-178 and in that SRM the Commission states, "In regard to the level of detail required in the applications for design certification and reflected as necessary in ITAAC, the staff should assure that it has all the details necessary to make the final safety decisions on the underlying design of the plant -- not decisions on the functions. Commitments to meed requirements are not substitutes for details of the designs which actually meet those requirements. However, the level

of detail required for those final safety decisions is expected to vary with the significance of systems, structure or components to the safety of the plant."

I maintain that an integrated digital safety system is one of the most important systems to the safety of the plant. Therefore, the design review should include necessary decisions to make the determination that it's safe. And that's a quote from -- My later was my own opinion, but it's a quote from an SRM. So that seems to clearly indicate at least in 1991 the Commission's feelings on the level of detail and the review with regard to actual design versus commitments to meet requirements.

MR. WILSON: Let me speak to that. You have to understand we're going back in history now and there are two things going on here. The papers you're talking about are the difference between staff design review and verification under ITAAC with traditional ITAAC in mind.

But a special situation came up with certain types of design information that were rapidly evolving and the Commission in their discretion issued a policy statement and said we are going to accept DAC in lieu of detailed design in those areas that we've been talking about today, digital I&C and human

factors. So that subsequent SECY interaction with the Commission --

MEMBER-AT-LARGE STETKAR: It's in the SRM though.

MR. WILSON: Yes, I understand.

MEMBER-AT-LARGE STETKAR: That says anything beyond this one.

MR. WILSON: I'm just explaining that what you're talking about is a traditional ITAAC and its relationship to the detail design review that we normally do. Commission said that in these areas we're going to do something different. We're accepting DAC in lieu of that detail design information and it's going to be verified in the normal ITAAC process. And that's just where we are.

Now if the Commission is accepting that on a case-by-case basis, the staff goes up with our design certification reviews to the Commission. And we say, "Okay. In this particular design, we understand there's two DAC here and as your approval of that you're also approving use of DAC in those areas."

We're also discouraging applicants in the future that we want to hold this down and hopefully one day eliminate it. Right now, we are where we are

and so we're trying to make the best of that decision.

MR. SHUAIBI: This is Mohammed Shuaibi with the staff. I'm Acting Deputy Division Director in the Division of Construction and Inspection of Operational Programs.

I would like to add a few things. Number one is I'm sensing that there are three things we're talking about. Number one is does the DAC process actually work which we're working with the Commission decision that we're using the DAC process in a few areas. So if we're questioning whether the actual DAC process works and whether that's a legitimate process to use in licensing we're not really -- we're not questioning that here. We're actually implementing a decision that was previously made.

Another sense that I'm getting in this decision is is the licensing decision in terms of the detail of the ITAAC that's being decided in design certifications and COLs is at the right level. Again, that's where your inspection staff will tell you that's a licensing type decision in terms of defining what the DAC reads like and when it gets accepted and goes through legal to rulemaking and becomes a DAC. That's why sometimes you hear the two different staff pointing at each other. So that gets decided in

licensing space in terms of what the DAC looks like, what it reads like. And in terms of design certification, that goes through Commission and then it gets decided through a rulemaking process.

So what we're working with here DAC that have already been established. So we're looking to get the right people out, inspect the licensee's implementation of that DAC to make sure they're doing it correctly, if they're implementing that DAC correctly. And that's the focus of this presentation.

And as a pilot program that we want to go out and try and sell Texas -- Remember South Texas is one of the earlier designs. This is the more general DAC that we're talking about. Will learned since then that they're getting more and more specific in terms of the information we're requiring to go into DAC. Not suggesting we agree on ESBWR yet. But in the area where we're looking at for this pilot, it's one of the more general DACs. So we expect for this to be one of the more challenging DAC inspections.

It's also digital I&C and we picked digital I&C because it's one of the more complex and challenging DAC to look at. So the purpose of this presentation is to show what we're doing in order to make sure that we have the right inspection happening

at the time we would go out and look at DAC.

So if it's okay with the Committee, what I'd like to request is if we could proceed with the presentation so that we can to what we're trying to do to make sure that we're doing the right thing on the South Texas DAC.

MEMBER BLEY: Let's do that.

MR. FREDETTE: Dennis, you asked about more detail on how we intend to use the technical staff and inspection.

MEMBER BLEY: Yes.

MR. FREDETTE: If I could run through the slides, then we could address that at the end.

MEMBER BLEY: Or as you go through, yes.

MR. FREDETTE: I don't have a slide that really talks in any detail about that, but I can expound on it a little bit.

MEMBER BLEY: Great.

MR. FREDETTE: Okay. We talked about the inspection strategies. It's basically a planning tool, but it's also a foundation for an inspection procedure that we're developing now. This is how we envision it. Okay. We're taken a lot of different sources that exist that are at our disposal. We tried to consolidate them and focus them into what we call

digital I&C system/software phase oriented strategy documents. These strategy documents generally match up with the software life cycle that's shown in the Branch Technical Position 7-14. They don't exactly match up because what I did was I consolidated a little bit in the interest of manageability.

But we have six of these strategy documents that we're developing that in general match-up with the software or the digital system development life cycle. And from those strategy documents, the Center for Construction Inspection which is in Region II will take those and develop the inspection procedure that I alluded to earlier.

The strategy documents as I mentioned they take input from the industry standards, existing guidance, staff expertise, lessons learned from audits, passed SERs, that type of thing. They are lifecycle phase-oriented. They feature key inspectible attributes and acceptance criteria and inspection techniques that the inspectors will use. And as I mentioned they are the precursor to the DAC inspection procedure.

MEMBER BLEY: Before you look at that one, are they reaching the point that you have drafts of them?

MR. FREDETTE: I've got drafts of four of them, four of the six.

MEMBER BLEY: We'd love to see your drafts whenever you're willing to share them with us.

MR. FREDETTE: Well, I think we committed in previous correspondence that we would provide a look at our process once we've refined it.

MEMBER BLEY: Right. We'd like to look along the way if there's a way to do that. Go ahead.

MR. FREDETTE: Okay. The focus for lifecycle phase-oriented inspection, it's process and technical activities within each lifecycle phase and not just the activities within the phase but the transition or the handoff between phases. In other words, when the digital system development goes from the planning phase to the requirements phase, from the requirements phase to the design phase, design and integration, we look at the hand-offs between those activities.

And our inspection intent is to typically start when activities for a given phase are complete. That's a lesson that we've learned from audits that have been done at AP1000 or for the AP1000 design where we were told that activities were complete and we get there and start doing an audit and find out

activities aren't really completed.

Lifecycle Phase Inspection, it's assessment of design processes and documentation within each phase. It's a sampling of all the inspectible attributes that we've outlined within the phase. We'll conduct vertical slice or thread audits were appropriate. And the last two are really the key, assessment of software QA processes and the independent V&V activities for each lifecycle phase. This is really the core of what our inspection process is going to entail.

The level of effort, we're still working on identifying what the level of effort is going to be. But it is front-loaded toward activities early on meaning the planning and requirements phases and we can scale it as we deem necessary depending on our level of satisfaction or our level of acceptability with the front-loaded effort. And this type of inspection will be conducted for each safety-related platform and software application.

In the case of South Texas, they're using two platforms, one for their RPS and one for their SFAS.

CHAIRMAN ABDEL-KHALIK: These six strategy documents are meant to be "universal," meaning

application independent.

MR. FREDETTE: That's right. Because in digital system development, everyone uses basically so type of lifecycle process. So they're meant to be tailorable depending on what process you might be looking at.

CHAIRMAN ABDEL-KHALIK: So regardless of the level of detail or specificity in the DAC these strategy documents would be applicable and would provide an appropriate level of guidance.

MR. FREDETTE: We believe so, yes. The attributes that we've identified in each one are attributes that you would see no matter what digital system you're looking at. They're common attributes amongst that the technical staff is used to looking at or looking for.

Just a little bit about the South Texas pilot effort. It's scheduled and driven by availability of the South Texas DAC products. There are some early products that are available now. We're just not ready to inspect them now. Originally, the pilot inspection was planned for the second quarter of this year. And at a public meeting we had a month ago, South Texas presented basically their forecast or their schedule for their entire development for both

of their platforms. Based on the schedule we feel like for the pilot effort that more a two-part or a two-stage inspection would be more appropriate. And that's what we've planned on engaging in.

Part one would be a program inspection of their high-level lifecycle planning and process which we anticipate to be conducted in June. And then there are some implementation activities that they're going to complete for one of their platforms later in the year. So we anticipate that we'll do an implementation inspection around in November 2010 time frame.

MEMBER BLEY: I was looking at slides from your public meeting a month or so ago. And I thought I saw a schedule that had this piloting running over a couple of years. Is that right?

MR. FREDETTE: No, the pilot won't run over a couple of years. I think we anticipate being able to finish the pilot at least 2010 or early 2011 at the latest.

MEMBER BLEY: Okay. So what you're going to do in November, how small a piece of the DAC pie on I&C is this?

MR. FREDETTE: This is a very small piece, Dennis. And this would be equivalent to the planning

phase or early stages of the planning phase of a development project. And recognize that a digital system development project can last three to four years. We're looking -- Our intent is to get in early on, look at the processes and the management documents that they've developed that are going to guide --

MEMBER BLEY: It's more of a process look. You're not getting into one system or subsystem in detail.

MR. TANEJA: The second part of the phase was that intended, right? The first part of the pilot was look at the process.

MR. FREDETTE: The process and then there are some -- As I mentioned, there are implementation activities that are part of that planning process that they're going to complete later this year. So we felt we don't want to just look at process. We want to look at some implementation activities that they've completed. Anyone can develop a process. It's implementation that's the key here.

MEMBER BLEY: We've been thinking the same thing. Go ahead.

MR. FREDETTE: The planned activities that we have, this is short-term anyway. We're working on completing the inspection strategies. Region II has

already started developing a new ITAAC inspection procedure. We've more or less selected the DAC product that we wanted to inspect internally. We haven't really publicized that yet with South Texas.

In the May time frame, we plan to tabletop our entire process with them so sort of validate with them how we envision this will work. We still have to identify the inspection staff that they're going to be engaged in this and then we'll conduct a pilot inspection as I said starting in June hopefully.

The pilot inspection is governed by the ITAAC inspection process which is Manual Chapter 2503 and the inspection documentation process which also includes inspection screening which is 0613. Issues will be screened and documented and docketed in an inspection report. The inspection report as we envision in the ITAAC inspection process, inspection report issues and anything else that we identify in the inspection will be used to support subsequent closure verification of that ITAAC at some later date which we envision will be in the construction phase.

MEMBER BLEY: Now let me ask you as question about how you -- And maybe it's come up. Put me off if it's come up -- envision this part of the process working. Because is DAC and as you described

in the sum of the DAC and the references to the IEEE standard and specific requirements there, aren't things -- you look at a panel and say, "Yes, they got one of these."

To meet those kind of criteria, for instance independence, you have to look a little deeper and understand how it's put together. And once you do that you will almost certainly have some questions of things that don't work. So is there some kind of a envisioned questioning process or do you think you'll just be able to take a look and write a report?

MR. TANEJA: This inspection is not really just looking at the equipment. This inspection is actually looking at the development stages that will take you to an as-built equipment.

MEMBER BLEY: But eventually I trust it's going to look at the end product which is a design and equipment.

MR. TANEJA: End product would be, for example, a factory acceptance testing. That is one of the final phases where you actually test the equipment in factory. Then the other opportunity would be on the pre-op testing. So there is plenty of opportunity to inspect the actual functionalities.

What we are looking at actually early on is the engineering that is required to develop these systems. Right. That would be even from the point of how many panels do I need, how many input cards do I need, you know, whether it's 2,000 inputs, whether it's 5,000 inputs and how are they segregated, all the divisions divided up. How do they assure that there is independence. All these things would happen in early stages, planning, requirement, design phase.

So a lot of that product would be paper. Tons of paper I imagine, at least what our impression has been since what we've seen so far on some of the other products.

MEMBER BLEY: I think you're close to what we've been asking.

MR. TANEJA: Yes.

MEMBER CORRADINI: I guess I want to make one thing just -- This is just for my clarification. So all that you're talking about which I'd love the others to decide the adequacy these are not amendments to the ABWR Design Cert. These are details from the generally licensed and accepted ITAAC/DAC for just South Texas COL.

MR. FREDETTE: That's right.

MEMBER CORRADINI: And the thought is once

you look at them here at least not the realization for South Texas but the intermediate part that we're talking about the detail design, then this will become a reference for future ones.

MR. TANEJA: If they choose to.

(Simultaneous comments.)

MR. FREDETTE: They'd have to use the same platform and the same application.

MEMBER CORRADINI: I understand. Okay. I just wanted to make sure that I understood that this was. So since you said early in response to his question, explain to me what early is. Does that mean before even I mean in the next few months? In the next year?

MR. FREDETTE: There is a schedule that's put forth by South Texas and the schedule, the details of the schedule, are proprietary.

MEMBER CORRADINI: Okay. Fine.

MR. FREDETTE: But I believe, Dennis, I think you've seen the schedule.

MEMBER CORRADINI: That's fine. You've answered my question.

MR. FREDETTE: We have South Texas here today and Mike Murray is the I&C manager at South Texas.

Is there anything you want to add to that, Mike, as far as your schedule goes?

MEMBER BLEY: And as Mike's coming over, some of this stuff has to be done quite soon if this is going to be in place to support upcoming operations some time in the future.

MR. MURRAY: Yes. Again I've met a number of you. Is this mike on?

MEMBER RYAN: It never is. Way on the bottom, Mike. There's a little slide switch. Yes.

MR. MURRAY: Okay. This is on.

MEMBER RYAN: It's tiny.

(Off the record comments.)

MEMBER CORRADINI: Just come sit at the table.

MR. MURRAY: Okay.

(Off the record comments.)

MR. MURRAY: Again, my name is Mike Murray. I've met a number of the folks earlier in the week. Some I haven't. I'm the I&C manager at South Texas 3 & 4. My background is I've lived at South Texas since 1985 and through the start up of both units. I've had different management perspective including I&C maintenance/management, maintenance engineering management, system engineering management.

So I've had a lot of opportunities at South Texas.

As far as the question was on the schedule and we've provided and I can't give details on it is what we've provided is the programmatic products that are developed. Some of those are available and that's one of the first phases that will be looked at.

And then what we've laid out is as we've gone through in specifically the software development for the I&C digital we've laid out in that schedule when each phase will be completed so that what we can do is inspect as we complete to have that assurance that we're meeting the regulations and that we will successfully be able to resolve the DAC, the ITAAC and DAC. So that's the schedule that we've laid out and provided.

Does that answer the question?

MEMBER CORRADINI: Yes. That helps. Thank you so much.

MR. FREDETTE: Our long term intention here is to be in lockstep with the licensee as they're going through their development so that we can be what I'd like to say on time on target at the various major milestones in their development process. So we have our finger on the pulse of their development process as it's going forward. It's marshaling the right

inspection resources with the right expertise in lockstep with the licensee that's really kind of the key as we go over the next two to three or three to four years in the process that Mike's basically given an overview of.

MR. TANEJA: This is Ian Taneja and Mr. Apostolakis earlier asked about why are we doing this now. It has to do with the critical path of the South Texas Units 3 & 4. Regulatory Guide 1.206 specifically requires the COL applicants to provide the schedule knowing the potential critical path of this in addition to that, the desire to have the design information very early on.

The critical path we have to understand now very clearly. It's going to be I&C design, simulator completion, operator training. There's no way out. It's known. It's going to be early resolution, a clear success path, understanding the schedule.

It's very important and that's why staff specifically asked from the beginning of the COL application to provide the schedule. Without the schedule, staff would not have the resources, budget and expertise necessary to fully support the verification of these activities.

South Texas has been very supportive of the request and that's why we are having a pilot. And that's why timing and scheduling resources is very important.

MR. FREDETTE: Post-pilot. As with a lot of pilot efforts, we want to compile and incorporate lessons learned, modify our process and ultimately integrate with the ITAAC Closure process.

MEMBER BROWN: Let me ask one question.

MR. FREDETTE: Yes, Mr. Brown.

MEMBER BROWN: When are you going to inspect for independence?

MR. FREDETTE: That's the requirements phase, Mr. Brown.

MEMBER BROWN: That's when? When is that? I mean the climate's already there. It's in IEEE 6.03. It says you need to be independent, data communications, all the walk-through. When are you doing to do that?

MR. JUNG: Mr. Brown, it's going to be throughout the process. The questions of independence, redundancy and diversity, these are so fundamental to NRC's inspection process. And I can't imagine we go out there and not asking data communication. It's so fundamental to digital I&C.

MEMBER CORRADINI: No, I think we understand that part. I think where we're asking it just to use this as an example is just this is an example. Is this going to be on series of audits? Is this going to be early when there is all kinds of paper? Or is it going to be at the -- That's what I guess I think Charlie's asking.

MR. FREDETTE: It's early on in their -- If I look at their lifecycle which might be three or four years long, we're talking about in the first quarter.

MEMBER BROWN: You're talking about the design lifecycle.

MR. FREDETTE: The design lifecycle.

MEMBER BROWN: When the person designing and building the system that you want, you've placed an order. He's designing it. He's got these requirements imposed on him as part of the contract.

MEMBER CORRADINI: And the certification.

MEMBER BROWN: As part of the contract. He's not in -- This guy's a subvendor. Okay. And he now goes -- When do you go say, "Okay. How does this design," as he designs it functionally, "going to meet the independence requirement? How is he going to execute or implement those design attributes that

allow you to determine that they are truly independent even though you're communicating from channel into division?"

I'm not arguing against that because you have to do some. It's a matter of how you would see the independence as you do it.

MR. TANEJA: Mr. Brown, this inspection, these key attributes, are without focus on inspection is. Essentially there may be, I don't know, 100,000 requirements. Those requirements could be trivial. But our key inspection points are going to be these key attributes and these are going to be inspected from day one from the time they lay out the requirement traceability metrics. That requirement document better have those requirements because the following design, the detail design, is going to have to meet those requirements. Correct? So our inspections start very early and it follows through each space.

MEMBER APOSTOLAKIS: But I would agree with you if I hadn't heard earlier that there is a distinction between a licensing decision and inspection.

MEMBER BLEY: Right.

MEMBER APOSTOLAKIS: Somebody said that

this issue of independence and so on is licensing. So the inspectors don't worry about it.

Now you're saying, "No, no, no. The inspectors worry about it from the very first step." I must say I'm a little -- more than a little confused here. If everything was ready during the design certification process, I know that the experts from the staff and our experts here at the ACRS, they would check these things and they would pass judgment.

MR. TANEJA: Let me draw a parallel.

MEMBER APOSTOLAKIS: Okay.

MR. TANEJA: Through mechanical systems. We say this pipe system is going to comply with the ASME Section 3. Right? It's not built.

ASME Section 3 is a very validated out process. We know exactly what materials are used, what the inspection processes are, what the testing requirements are. Right? So we say, "Yes, if you do ASME Section 3, this design is good, certified." Right?

Essentially take that process, same thinking. Here we're saying, "This design is complying with IEEE 6.03." Right? Now we are essentially saying that this design is not built. I mean naturally it's not built. It's as-built

verification that you are verifying that, yes, your design does comply. So that verification stages you are verifying those attributes.

MEMBER APOSTOLAKIS: But there is a problem with the example though. During the design certification process, I'm sure the staff and certainly some members of this Committee would ask the question whether this particular piping is independent or is subject to common cause-failure with some other pipe.

The ASME Code does not address that as far as I know. The ASME Code tells you what materials to use or how to build the pipe.

This is the same thing now with the digital I&C. At the DCD phase the way I understand it we would worry about diversity and independence and so on. After we have satisfied ourselves that they are truly independent, then there may be some rules how you build it.

So the question -- I mean there is really different things here that are involved. And I don't think the example with the ASME Code is an appropriate one because at the system level I may have interactions that the ASME Code really doesn't address.

MR. TANEJA: At the design stages the design details is given at a higher level for the I&C systems. Right? At a block level diagram, it very clearly lays out for example for the Reactor Protection System there are four divisions. They are physically independent. They're located in four different rooms. They are --

You know what we see in the design for the ABWR that was certified and the communications protocols are very well explained that the communications will only take place from this division to three divisions in one-way mode and it's done in that fashion. So those are the requirements that are spelled out.

So what we are doing in the inspection phase right now is verifying that the design is capturing those requirements and as-built design will conform to those requirements.

MEMBER BROWN: But one-way doesn't meet the test. I mean the one-way communication does not mean it's independent. Fiber optic does not mean it's independent because it's the nature of the data and how it's utilized in the other divisions that can compromise the independence.

MR. TANEJA: That's where we can up with

the --

MEMBER BROWN: Let me finish quickly here. And you can't do that as-built after the equipment is designed and manufactured. You have to do that as part of the early part of the design stage.

That's the point of getting in early because it's -- And it's not a matter of -- I'm not trying to save these guys from some bad things happening. It's a point of understanding because we don't have that understanding as part of the DCD process. It's not in there.

MR. TANEJA: The DCD process makes commitments to complying with the ISGs that we put together on communication.

MEMBER BROWN: I understand that.

MR. TANEJA: The advanced technical position -- See, those are the guidance that are there that would be used for inspection also. For us, if the design was there at the design phase for the NRC agency engineers' review, we would use those guidance documents. That's what we would use.

MEMBER SHACK: I think in a sense the design --

(Simultaneous comments.)

-- certainly you'd call that a review.

You're calling it an inspection now.

MR. TANEJA: Same thing they're doing.

MEMBER SHACK: But the process is the same.

MR. TANEJA: They are doing the same thing.

MEMBER SHACK: He's got the same requirements whether -- You know he's got the branch tech. It comes back to Said's thing. There's no guarantee that we have every regulation that we need in order to assure. But we're in no different in the DAC sense than we are in any regulatory sense that we never know our regulations are absolutely complete.

But the inspection he's talking about here is not some guy looking at the wire. It's some guy reviewing the report as he would --

MEMBER BROWN: It's the design not the report.

MEMBER APOSTOLAKIS: Let's put it in a different -- Okay. Jerry mentioned earlier there are three or four places where there are opportunities to review the DAC.

MR. WILSON: Three options.

MEMBER APOSTOLAKIS: Three options.

MEMBER BROWN: DCD, COL and --

MEMBER APOSTOLAKIS: And this inspection -- And there is an inspection after the third one or the third one is the inspection.

MR. WILSON: The third one is --

MEMBER BLEY: The first two get the normal kind of review with the --

MEMBER APOSTOLAKIS: Okay. Suppose now that there has been a satisfactory review at option number one.

MEMBER CORRADINI: Certification.

MEMBER APOSTOLAKIS: So in one case there has been a successful licensing option one. In the second case, it hasn't been. What would you do different when you go to inspect and you know that there has been a review of the DCD option and in the other case you know that it hasn't. Are you going to do anything different?

MR. TANEJA: The ITAAC would be more --

MEMBER APOSTOLAKIS: I don't understand. If you clarify that for me, I'll be happy.

MR. WILSON: Let me try. Remember now -- Let's back up. In a normal situation you would design review. The ITAAC is a verification of the as-built of the hardware. DAC is special.

MEMBER APOSTOLAKIS: Yes.

MR. WILSON: So in those cases that design review is being shifted out. So option 2, the combined license applicant could provide that design information for their particular application. We would do that review as part of the combined license review. Option 3 which is where we're going to be in most circumstances is that design verification is going to be done as part of the ITAAC inspection process.

MEMBER CORRADINI: Clarification. You shifted from review to verification. I noticed that word.

MR. WILSON: Yes.

MEMBER CORRADINI: And that's why I went to Jerry. So is South Texas example option three?

MR. WILSON: Yes.

MEMBER CORRADINI: Okay. So we're clear on that. So now going forward that you've made that very interesting change of words, now we're not into design review. We're into verification. Can you go forward now?

MR. WILSON: Because it's an ITAAC inspection, it's a special type of ITAAC. But what we're looking at is design information and it's not generally -- I'm making a general statement now.

MEMBER CORRADINI: So let me give you a hypothetical.

MR. WILSON: It's not the typical inspector coming out of Region II. We're going to be relying on Headquarters staff for that verification effort. But it's still an inspection.

MEMBER CORRADINI: So can I just take this a bit further with numbers? I'm sorry. I'm just an engineer. The certification was done a decade ago. The COL is in process now. A year from now in 2011 the COL is granted. We're into option three. Now we start seeing details. Where in the time that the COL is granted to, let's just assume it takes five years to build this thing, are we going to start seeing the early phase verification to satisfy these two gentlemen just as a way of trying to example this out? That's where we're struggling.

MR. WILSON: I understand and as I said that's a decision made by the licensee. They are going to decide when they start sending those closure letters in and notifying us. One of the requirements we place in the licenses is give us your schedule for closing out ITAAC and that it includes the DAC so that we can -- As Tom points out, we want to be out there doing that as this is happening. But that's their

decision.

MEMBER BROWN: So as a member what we have to be since we are looking at the COL if we want to have a warm fuzzy that the design that's going to be executed, we need to be extra vigilant in terms of our review. For instance when Chapter 7 comes up, we're going to have to expect more information to allow us to be comfortable because we won't know what's going on five years from now when you do this other inspection.

MEMBER CORRADINI: Verification.

MEMBER BROWN: Verification.

MR. WILSON: Well, I understand. We're back to the South Texas case.

MEMBER BROWN: Look at their --

MR. WILSON: South Texas is referencing the ABWR. There's no additional information in their combined license application.

MEMBER BROWN: In ABWR, they're changing the architecture so there is more information, more details, that have to be provided to show it. All architecture is changing. So it's all got to come in to be reviewed.

MEMBER BLEY: The COL.

MEMBER BROWN: The COL, part of the COL,

yes. Correct. So what we should -- I'm just trying to understand where we should expect to be able to ask the kind of questions and get these answers to know how are you going to do this. How are you functionally, not the detail but functionally going to accomplish these major attributes? Because you've got to have some feeling that that's going to come out okay. Otherwise how in the world do you say Betty Crocker/Good Housekeeping seal of approval on it.

MEMBER CORRADINI: They're just going to be tough and not let the plant start up?

MEMBER BLEY: I think we've got this on the record. I'm going to try to take an optimistic approach and ask you guys at the table a question. My optimistic approach is I'm going to assume that these DAC inspection strategies you're developing will give the kind of answers we're talking about.

And I'm going to ask you to tell us when we can start looking at those. And we don't need to have the whole bunch. We could look at them one at a time. We'd be happy.

MR. FREDETTE: They're in draft stage right now.

MEMBER BLEY: Understand.

MR. FREDETTE: Now draft is just a word.

Okay?

MEMBER CORRADINI: It can be a draft for a very long time. I understand.

MR. FREDETTE: The meat of those documents at the four that I've developed so far is sufficient that Region II can start working on their procedure. The attributes are there. The techniques are there. They acceptance criteria is laid out. So I can provide those as soon as you want.

MEMBER BLEY: We'd love to have them now, not at the table, but --

MEMBER-AT-LARGE STETKAR: This afternoon would be okay.

(Laughter.)

MEMBER BLEY: We'd like to look at them and then of course later we'd like to talk to you about them. So I give it back to you to go ahead. You've got only a few more slides I think.

MR. FREDETTE: Yes, just a couple more.

MR. MURRAY: Mr. Chairman, can I add some more on the schedule?

CHAIRMAN ABDEL-KHALIK: Yes.

MR. MURRAY: I feel that I need to on that. Looking at it and I'm going to use a colloquial term "where the rubber meets the road" which is

implementation. We clearly understand that that is an important piece of it. In our schedule, we've laid out not only like you said earlier anybody can write a program and we understand that.

But we've laid out the programmatic portion in our schedule and it's complete a large portion by 2013 area. So that's how rapidly we're moving and when I say "rapidly" that's not as in taking shortcuts. That is in to support our schedule.

And in that laid along the way is where the rubber meets the road on each piece of the process. And the example that Tom has discussed is one piece of it programmatically. Part two is how did you do it, South Texas project licensee? Did you meet what your program said and is the program meeting the requirements?

I want to go back to the requirements. The requirements are laid out. We have to meet the regulations as we design it. We have to ensure that it meets the diversity, defense-in-depth. We have to meet all those requirements as we go. And our schedule lays out where we expect the rubber to meet the road.

MEMBER BLEY: In my case and as I understand it, you have the pilot starting in the

fall. Is the anticipation that even after the pilot this is going to proceed as you get more things along your development path the review will follow along?

MR. MURRAY: And that's the schedule --

MEMBER BLEY: The verification will follow along.

MR. MURRAY: And that is the schedule we laid out so that the NRC Inspection Branch can understand where we'll be as we implement the resources. Both ours and the branch's are available for the inspections to take it through the process.

MEMBER BLEY: And we'll be very interested in following this process all the way through.

MR. SHUAIBI: And that's what I wanted to say is I think what I'm sensing is what would probably be most useful for the Committee is after we go through the pilot is if maybe we can come back and share with you what we've learned. Again going back to this South Texas, this is ABWR. This is probably the most general DAC you're going to see.

It's digital I&C, one that you're very interested in. It's very complex. We're trying to pilot this so that we can decide how to move forward in this area. So maybe we'll come back and share with you what we're learning from the pilot and we'll see

where that goes.

MEMBER BLEY: Let me sneak in a quick question. We haven't gotten Chapter 7 of the COL yet from you guys, the FSAR. But we've just done the human factors engineering and what we learned there was that something equivalent to the details that are beginning to show up now in DAC in that area is actually in an appendix to the Chapter 18 and that's the process they're going to go through.

Is there something kind of equivalent in I&C? When we get Chapter 7, will there be an appendix that's really laying out the requirements and how you're meeting them? That will help us in this process.

MR. MURRAY: I understand.

MEMBER BLEY: I'm just curious.

MR. MURRAY: And we've discussed that and our plan is to show the regulations and requirements that we are following with the design.

MR. SHUAIBI: And I guess we can take that back as a question and get it back to our --

MR. SWANNER: I have the answer to that. Hi. My name is Craig Swanner. I'm with Toshiba America. I'm supporting South Texas licensing of the DAC and Chapter 7. The same analogous chapter you're

asking about from human factors is also in Chapter 7(b) Tier II. So if you take a look at that, basically the requirements, the more detailed requirements from DAC, are laid out in there for the software/hardware development.

MEMBER BLEY: Perfect. Thank you. We'll look at that before we have further conversations. Tom. I'm sorry.

MEMBER BROWN: Tier II is not being revised. That's my understanding. I asked that question in the meeting.

MEMBER BLEY: So it might already be there in the --

MEMBER BROWN: It's the COL.

MEMBER BLEY: It's the thing we're reviewing, the COL document for Chapter 7.

MR. WILSON: The FSAR.

MEMBER BROWN: Thank you. The FSAR. Thank you.

(Off the record comments.)

And is that what you're talking about? The FSAR chapter?

MR. WILSON: Yes.

MEMBER BROWN: Okay. We're on the same page. Thank you.

MEMBER BLEY: Tom, back to you.

MR. FREDETTE: Just to wrap up here. Long-term as I had mentioned, South Texas provided a schedule for DAC availability through factory testing. Mike just expounded on that a little bit. We're working on identifying all the DAC inventory among all the designs. South Texas is kind of an outlier. As I mentioned, ESBWR DAC is very extensive, but it's also much more specific than what you see in ABWR. And then we're working to identify the other DAC related ITAACs that are out there and we'll plan accordingly to accommodate inspection of all of them.

For the future Post-Pilot, we need to work with NEI to modify NEI 08-01 and the reg. guide. The language in the 08-01 for DAC inspection refers to the EDV process and that's really not going to be the process. So that will need to be updated.

MEMBER BLEY: I have a little question. But you have this task working group. So you guys are working together. You were saying after you finish these you pass them onto Region II who will write the procedure. But given the nature of some of this verification process and the need for expertise here, I'm assuming, maybe I'm wrong, that there will be quite a bit of interaction in the development of the

inspection guide to make sure it goes beyond the usual kind of descriptions like picking up the things you're writing down.

MR. FREDETTE: I mentioned this early on, Mr. Bley. It's first of a kind type of inspection. So Region II is developing the procedure only because they developed all the other ITAAC procedures. So we want some uniformity there.

As we envision it, the procedure is basically going to contain a series of attachments that basically take all of the input that we've provided in those strategy documents and translate them over into inspection type steps.

MEMBER BLEY: Very good. Are you finished or do you have more?

MR. FREDETTE: I do. I'm finished and I wanted to get back to you asked a question about --

MEMBER BLEY: Are you going to use these experts?

MR. FREDETTE: Understand more how we intend to use the expertise that exists here in Headquarters. It was recognized earlier on that for digital I&C being a complex discipline the only expertise that we had within the agency resides here in Headquarters to do those types of inspections.

As we envision it because Region II has the lead for ITAAC inspection, they will open an inspection report on the South Texas docket. They will lead the inspection, but the inspection will be done -- it will be a detailed review of all of the products that come out of the design process. And those will be done wherever those products are made available.

MR. FRYE: Tom, if I could just kind of add to what you just said. This is Tim Frye again, NRO Construction Assessment. Headquarters has the lead for developing the inspection procedures. We're working closely with Region II to get their input. We're the program office. We're developing the inspection procedures.

MEMBER BROWN: For the digital I&C.

MR. FRYE: Right. And in fact we just recently had a workshop with Region II and our technical branches the last two days on developing the ITAAC inspection procedures and the strategy documents. And they are very closely tied.

So I just wanted to emphasize that Region II is not independently developing the inspection procedures. We had the responsibility for that. They have some expertise down there. We certainly farm out

some of the development work to them. But we're coordinating the work by Region II and the technical branches. I just wanted to clarify that.

MEMBER BLEY: And we understand what a big project this is. How difficult.

Would you hit 13 and return? It will jump you back to 13. Okay. There is a couple things on this slide I wanted to get some details on. Thread audits where appropriate. Requirements design and we've been talking about that, code and testing. I'd like you to talk a little more about this.

Depending on who we talk to, we hear that there will be sample audits or because DAC is a new thing and the I&C system is so pervasive and important. The verification on DAC will be complete. All of them will be reviewed in detail. What do we mean by audits? And you talked about horizontal and vertical slices. Is it really going to be 100 percent look at the DAC?

MR. FREDETTE: I don't think we could say it's 100 percent look. A thread audit is a -- Some people call it a vertical slice, but it's basically taking -- Dinesh mentioned the requirements traceability matrix earlier. When we do audits of the design process, we'll conduct a threat audit where

we'll look at a sampling of requirements and be able to trace how that requirement was translated from the safety analysis and the plant functional requirements to the functional requirements/design requirements and then the outcome of the requirements phase is typically a software requirements spec which sets the stage for the next phase of the design process which is taking the software requirements and translating them into a software design description and a systems specification.

The systems specification is then translated into instructions for writing code translate which basically is a translation of your safety analysis requirements, your functional requirements down to someone actually typing out code and then identifying how that requirement is going to be tested. It's the ability to trace from the requirements phase all the way through to testing and back and forth. That's what I consider a thread audit.

MR. JUNG: This is Ian Jung. There are two ways to look at it, Mr. Bley, in terms of you heard about sampling of ITAAC. My understanding is all DAC are targeted ITAAC. That's one thing you should understand.

MEMBER BLEY: Explain that because that's close to what I think I've heard before, but give me a little more detail on that.

MR. JUNG: What that means is that as-built ITAAC, you know you've been briefed on .4 of this point system that anything beyond a .4 they are considered targeted ITAAC given the safety significance and high value on that attribute. My understanding is all DAC are considered targeted ITAAC. That means some type of verification will happen for each of the DAC items.

MEMBER BLEY: Okay. That's what I had heard.

MR. JUNG: Secondly, in terms of these items, there are words like "assessment," "sampling," "thread audit. I believe it will have to do a combination of this. For those types of information that we should have seen in the licensing review that are not available at the time of licensing, we'll do a -- Our verification will be more like reviews, like document reviews.

But implementation activities such as testing, those type of activities, more of the implementation activities, we'll do more of a sampling thread audit, those approaches, because we are talking

about sometimes several cabinets full of documents. Simply we cannot do every case of scenarios for tracing all the requirements which is exactly a lot of times what happens even in the licensing space. And in those spaces where we don't have resources, we have to sample to make sure the process is followed and those cases demonstrate they're following the right process and right requirements are being checked to see they are compliant.

MEMBER BLEY: Okay.

MEMBER APOSTOLAKIS: I have a simple question. Maybe it has been answered. But after a DAC is successfully resolved, is there going to be a letter from the ACRS to the Commission?

MR. WILSON: No.

MEMBER APOSTOLAKIS: There is a letter from the ACRS when the Commission is deliberating whether to satisfy a design.

MR. WILSON: Yes.

MEMBER APOSTOLAKIS: A DAC is a piece of that that is postponed. And yet the ACRS will not write a letter?

MEMBER CORRADINI: That is true. That's my understanding.

MEMBER APOSTOLAKIS: Well, why not? I

mean the law says that the ACRS has to write a letter when it comes to such serious licensing actions. There ought to be a letter from the ACRS. How can the Commission make a decision?

MR. FRYE: If this is an inspection activity, it's not a licensing activity.

MEMBER APOSTOLAKIS: No. I'm sorry.

MEMBER CORRADINI: It's a verification activity. It's neither.

VICE CHAIRMAN ARMIJO: That's a central issue, George, in that the ACRS' last involvement is at the COL or the DCD.

MEMBER SIEBER: It won't be resolved.

VICE CHAIRMAN ARMIJO: And in those proceedings you have to decide whether the DAC are sufficiently detailed and specific that we can trust that process to build the plant properly and that's our problem.

MEMBER APOSTOLAKIS: Absolutely. And especially for digital I&C. It seems to me it's not a simple verification.

MEMBER CORRADINI: So I want to ask Jerry this since he asked the question, but I was thinking it. Since it's neither licensing nor is it inspection and it's this new word verification, has it yet to be

clear whether ACRS should comment on something like this?

MR. WILSON: Don't' draw a distinction between me saying verification and inspection.

MEMBER CORRADINI: But we did.

MR. WILSON: It's the same thing.

MEMBER CORRADINI: We were listening closely.

MR. WILSON: An inspection is a verification.

MR. FREDETTE: Using the words interchangeably.

MR. WILSON: Yes.

CHAIRMAN ABDEL-KHALIK: It is not a review.

VICE CHAIRMAN ARMIJO: But it's said by two different people.

MR. FREDETTE: That's right. That's the key right there. We're not doing -- The activities that we would be doing in an inspection space are similar to what you would do in an audit. We're just not calling it an audit because we're in ITAAC space now.

MEMBER APOSTOLAKIS: Is there a direction from the Commission that says that the ACRS does not

need to write a letter?

MEMBER CORRADINI: There's no comment. It's silent as far as I can tell.

MR. WILSON: Let me go back in history and just say that when the DAC process was created and the Commission approved its use this point that Dr. Apostolakis is making my recollection is was not considered.

MEMBER APOSTOLAKIS: Was not considered. So there really isn't really any clear direction as to which way we should go.

MR. WILSON: That's correct.

Let me speak to members of the Committee who may be changing their position in the near future.

(Laughter.)

They can ready in at the appropriate time.

(Off the record comments.)

MR. FREDETTE: On this particular slide, Dennis, did we --

MEMBER BLEY: Yes. I was a little uncomfortable the first time when you said that software QA assessment and the assessment of V&V was the heart of everything. I've heard enough now that I don't think I want to pursue that with you.

MR. FREDETTE: Not the heart but those are

key assessment activities.

MEMBER BROWN: What was the second one you said?

MEMBER BLEY: The last two bullets here. Tom said these are really key things and I think they are, but the design, looking at the design is the piece I wanted to hear more about and I still want to see more about that as we get these documents.

Anybody on the Committee have anything more they want?

MEMBER CORRADINI: No.

MEMBER BLEY: Gentlemen, thank you very much for your presentation and discussion. Very helpful. We look forward to seeing your strategy documents and seeing you again.

MR. FREDETTE: Thank you.

MEMBER BLEY: Back to you, Mr. Chairman.

CHAIRMAN ABDEL-KHALIK: We do look forward to receiving your strategy documents. We will see if we can schedule subcommittee meetings to review the strategy documents and perhaps a full Committee meeting following that. Thank you.

At this time, we're going to go off the record. We have a break scheduled at 10:15 a.m. for 10:30 a.m. So we have about ten minutes. I would

like to read the first draft of Mr. Ray's letter in the next ten minutes and we will start our break at 10:15 a.m. We're off the record, sir.

(Whereupon, a short recess was taken.)

CHAIRMAN ABDEL-KHALIK: We're back on the record. At this time, we will hear about new advanced reactor designs. And Mr. Bley will lead us through this discussion. Dennis?

MEMBER BLEY: Thank you, Mr. Chairman.

Well, this is, I think, going to be an interesting one for all us. It's an overview from NRA of some of the new designs that they are beginning to look at and where things are headed. And it's certainly an information briefing so we're delighted to have you here and look forward to hearing.

Mike, I'll turn it over to you.

MR. MAYFIELD: Thank you, Mr. Chairman.

The first thing I will promise you is you will not hear us say a single phrase called DAC or ITAAC.

(Laughter.)

MR. MAYFIELD: I promise you we will not utter those words today. I have no promises for the future.

Bill, can we get the first slide?

I am the Director of a thing called the Advanced Reactor Program. There we go. We started seeing a lot of interest from the industry, a lot of people coming in and wanting to talk to us on pre-application discussions and interactions with domestic suppliers. Congress passed the Energy Policy Act of 2005, which established the Next Generation Nuclear Plant, so a collaboration between us and DOE looking at licensing a high temperature gas reactor.

There is just a phenomenal amount of interest in the class of reactors called small modular reactors in the international community, principally from the so-called new entrant countries, these are folks that don't have a current domestic civilian nuclear program but want one. And many of them have figured out that first of all, they can't pay for a two to six billion dollar nuclear power plant, and even if somebody gave them the money, they don't have the grid to support it. So there's a lot of interest from those folks. And they keep looking to us for certified designs. So that has been an interesting tidbit.

We established the Advanced Reactor Program a little over a year ago. It's one of the three major subprograms in the Office of New Reactors.

Our responsibility is licensing for anything that is not a large LWR. Now I should emphasize power reactors. We're not doing research and test reactors. We're not doing medical isotopes. Power reactors, if you're not a large light water reactor, you're going to come chat with us.

We -- let me emphasize for you, this is a licensing program. Historically when advanced reactors have been discussed with the Committee, it has been in the context of a research activity, getting ready, exploring some of the new technologies.

This -- the Advanced Reactor Program is a licensing program. We have a strong interaction with our Office of Research. We can't be successful in doing this without them. And we have an active dialogue with our colleagues up on Church Street. But the fact is this is now a licensing program.

Our priorities, as with any bureaucratic organization, start with staffing and resources. Absent that, we're not going to be very effective.

We're looking -- and you'll hear a little bit more about developing regulatory infrastructure, addressing generic policy issues, both of those things are likely to appear before the Committee as we go along, particularly so the policy issues.

The Commission has historically wanted to hear from the ACRS on staff's proposals for addressing policy matters. So we would expect to bring our proposals for addressing policy issues to the Committee as we go along. And we'll talk a little bit more about what some of those things are.

We are focused on being prepared for the next generation nuclear plant. The interactions with DOE, both through the research program and now more directly in the context of licensing, we have active interactions with them. You're going to hear some about that, their presentations next week at the RIC dealing with some of this. But that has been a very active and continues to be an active bit of interaction.

And then we are starting to really gear up for interacting pre-application review -- pre-application discussions with the other small modular reactor applications, the integral PWRs in particular.

Next one, Bill. This just -- again, to emphasize our interaction with the Office of Nuclear Regulatory Research, they are here -- I believe it's next month -- to talk about some of their research activities focused on advanced reactor work.

Their sort of the principle activities,

they're focused on NGNP, coordination with DOE, development of independent analytical models and tools, materials research. And they have just this year started at looking at some plans for the integral PWRs with the helical steam generators, natural circulation. Are the tools really adequate -- the analytical tools adequate for those applications?

We're paying some limited level of attention to the sodium-cooled fast reactors, limited attention in the sense that the time horizon for them is probably further out. Even though some of the vendors would like to bring design cert applications as early as 2012, the fact is that the customer base appears to be more interested in the integral PWRs than in sodium fast reactors.

So we are maintaining some low level of interest and paying attention to those, looking at any specific policy issues where we would need to be prepared to deal with it but we're not ramping up at the same level as we are for the integral PWRs and the high temperature gas.

MEMBER CORRADINI: Can I ask a question at this point? May it's the wrong point but when we once had this -- and I don't remember if it was a combination of NRO and Research or just Research back

in January of `09, what we heard at that time was we are aware, we're paying attention, we're preparing. But until we see a potential Applicant to build something in the United States, we're aware, we're watching, we're preparing. And the only thing on the agenda is NGNP because of the EPAct of 2005.

MR. MAYFIELD: Right.

MEMBER CORRADINI: Has that changed?

MR. MAYFIELD: There's been a shift in the Commission's view on that. And the direction we've been getting through some budgeting decisions is start moving. We're not going wholesale but we're starting to get resources that support a more active engagement.

We do not yet have resources to fully take on a design cert review. But we're getting enough that we can take that next step. It's not quite just -- we're sitting back waiting and watching.

MEMBER CORRADINI: So to say it differently, just so I'm clear, even though there may not be a customer for integral water reactor A or integral water reactor B, there is going to be funding available so that you can staff up and prepare for pre-application processes?

MR. MAYFIELD: Yes. And to take it -- and

to be ready to take it to the next step.

MEMBER CORRADINI: Okay.

MR. MAYFIELD: That, of course, won't come until `12, `13. So the expectation is we will be ready to move forward.

One of the things that we have learned from the large light water reactor reviews is doing these things in parallel, design cert and COL is not such a great idea.

(Laughter.)

MR. MAYFIELD: The notion of requiring a domestic customer sort of sets you up for that bit of failure.

MEMBER CORRADINI: Right.

MR. MAYFIELD: You're almost guaranteed then to do the COL and design cert in parallel. And so we've sort of recognized that that's maybe not the best idea we ever had. And so the Commission is supportive, within limit, of being prepared to move forward.

VICE CHAIRMAN ARMIJO: But it's not a good idea to do a design cert and a COL 15 to 20 years apart either --

MR. MAYFIELD: Exactly.

VICE CHAIRMAN ARMIJO: -- which is what we

managed to do. So as long as you don't say DAC.

(Laughter.)

MR. MAYFIELD: You said it, I didn't.

MEMBER CORRADINI: The second, I guess, part of my question is so given that, at least in NGNP space, the EPAct 2005 allowed DOE and NRC to come up with an MOU on proper resource sharing and planning. In the -- are we going to -- when we get to it, is there something being planned in terms of the integral -- so the small water reactors, in this regard, because of the fact the DOE now has in their program plan to fund this and, therefore, I assume part of that funding is going to have to be --

MEMBER BANERJEE: But it hasn't -- the White House has had problems with that.

MEMBER CORRADINI: Well, I mean --

MEMBER BANERJEE: Yes.

MEMBER CORRADINI: -- we'll let the politics go along but assuming DOE is that -- has there been discussion in that regard? Or is it --

MR. MAYFIELD: Not in the same context of an NGNP-like structure.

MEMBER CORRADINI: Okay.

MR. MAYFIELD: However, we do have active dialogue with the folks at DOE that are responsible

for the integral -- the small modular --

MEMBER CORRADINI: Okay.

MR. MAYFIELD: -- things other than NGNP.

MEMBER CORRADINI: Thank you.

MR. MAYFIELD: So there is an active dialogue but it's probably not -- and you never know exactly where the Administration will finally come down. We do not expect that it would like an NGNP program.

MEMBER CORRADINI: Okay. Thank you.

MR. MAYFIELD: Okay?

MEMBER APOSTOLAKIS: The Energy Policy Act of `05 explicitly states that the prototype for NGNP should be licensed using some probabilistic something. And then the second one, risk based.

Is part of your development of analytical models include addressing that part? Is that something you are going to do? I mean there is a letter from us --

MR. RECKLEY: When we talk about NGNP, I'll get into that --

MEMBER APOSTOLAKIS: Good.

MR. RECKLEY: -- a little bit.

MEMBER APOSTOLAKIS: Okay, okay, good.

MR. MAYFIELD: But we did, in conjunction

with DOE, explicitly address a licensing strategy. And that report went back to the Congress.

MEMBER APOSTOLAKIS: Right, right.

Now you also have sodium-cooled reactors and all that, what happened to that poor technology neutral framework NUREG-1860? Is that languishing some place? Are you guys planning to --

MR. MAYFIELD: Languishing is probably not a fair term but --

MR. RECKLEY: But what we --

MR. MAYFIELD: Go ahead, Bill.

MR. RECKLEY: What we informed the Commission was that the timeline that had been set our for that which was, compared to now, near future, I forget exactly what it was but we were supposed to be making recommendations either this year or next year on regulatory changes to address that, so we informed the Commission in a policy paper last year that we wanted to do that in parallel with the NGNP review, which would push that recommendation out into the 2015 kind of time frame.

I know it sounds a long way away but what it does is it allows us to develop that in parallel with the actual review of the NGNP application.

MEMBER APOSTOLAKIS: Yes.

MR. RECKLEY: So it's not been dropped but it was deferred such that we wouldn't develop it to support NGNP necessarily but we would do it in parallel.

MEMBER APOSTOLAKIS: What does it mean doing it in parallel? I mean you would put yourself in the situation and you would say -- where you would say if I were to license the NGNP with a technology-neutral framework, how would I do it, is that a logical way to proceed?

MR. RECKLEY: Well --

MEMBER APOSTOLAKIS: It's not actually licensing.

MR. RECKLEY: Yes. The way I envision this is as we're looking at NGNP, we'll be at least looking at one technology such that we can know how it works with one technology.

VICE CHAIRMAN ARMIJO: And it's a very different technology.

MR. RECKLEY: And then we can --

MEMBER APOSTOLAKIS: Well, that's the point.

MR. RECKLEY: And then we can -- but then we are in a better position, I think, to look over and say, okay how would this work for a fast reactor

technology? And does it work? And if it does, then you have the beginning of a technology-neutral approach.

MEMBER APOSTOLAKIS: But do it in parallel with the NGNP?

MR. RECKLEY: Right.

MEMBER APOSTOLAKIS: So you're going to think about the sodium reactor at the same time?

MR. RECKLEY: No. As we develop an approach for NGNP or HTGRs, we can then look at that approach and see is it so specific to HTGRs or is it possible to take that concept and phrase it in such a way that it would be technology neutral and work for other technologies.

MEMBER APOSTOLAKIS: I think that's something -- I mean obviously it is too early in the process. But that's certainly something that I think is worth thinking about because if we miss this opportunity, we will keep saying, you know, in the year 2030, they will come in with some exotic reactor -- well, there isn't really time to risk inform anything.

MR. RECKLEY: Right. And then --

MEMBER APOSTOLAKIS: So this is the opportunity.

MR. RECKLEY: Well, and it is. And, you know, we are, in the industry, are looking and, you know, as they do ANS 53.1 -- I think I've got the numbers right -- for the HTGR, the community is starting to pick up ANS 54.1 for the fast reactor technologies. So with these things going on at the same time, I think --

MEMBER APOSTOLAKIS: But at some point, you gentlemen will develop some sort of a plan type to actually do these things.

MR. MAYFIELD: Well, let's wait. It's actually a little further along than that.

MEMBER APOSTOLAKIS: Good.

MR. MAYFIELD: In the paper that Bill mentioned from last year, the commitment we made to the Commission is that as we are invoking the licensing strategy for NGNP, we will also test basically the 1860 technology.

MEMBER APOSTOLAKIS: Yes, good, good.

MR. MAYFIELD: And look to see if you get sensibly the same kind of answers on licensing NGNP.

MEMBER APOSTOLAKIS: Or better.

MR. MAYFIELD: Or better.

MEMBER BLEY: In some sense.

MR. MAYFIELD: You and I have been down

this path, we're not going there again. But we will give it a fair test on that technology contrasted to the deterministic supplemented by risk information. So it will be a fair test --

MEMBER APOSTOLAKIS: Good.

MR. MAYFIELD: -- of that technology -- that approach to licensing. We can then inform the Commission of those findings. And use that as a basis for deciding well, how far -- how much further do we go. There's a lot of interest nationally as well as internationally in a technology-neutral framework. So this isn't something that is likely to slip, particularly some of the new Commissioners that may be coming on.

This is not like something that is likely --

MEMBER CORRADINI: The second one of the day --

MR. MAYFIELD: -- to slip a lot. It's not going to go until 2030 before it gets some additional attention.

MEMBER APOSTOLAKIS: Now you said that you submitted the document to the Commission. Is that the secret document or what?

MR. RECKLEY: No.

MEMBER APOSTOLAKIS: Can this Committee have it?

MR. RECKLEY: We have it.

MR. MAYFIELD: It's a SECY paper that we'll be happy to make sure that you have it.

MEMBER APOSTOLAKIS: Yes, I'd like to see that. I don't know about the rest of you.

MEMBER BLEY: I haven't noticed it going by so it would be nice to get.

MR. MAYFIELD: Well, we will take an action to make sure that the Committee has it.

MEMBER APOSTOLAKIS: Thank you very much.

MEMBER CORRADINI: So last thing, I know you're -- this is all one intro but what the heck -- so is this an appropriate priority list? Is this prioritized? Or it just happens to be a list in alphabetical order?

MR. MAYFIELD: It's quasi-prioritized.

MEMBER CORRADINI: Okay.

MR. MAYFIELD: I think we write things down in the way we -- sort of the order we're thinking about them.

MEMBER CORRADINI: Okay.

MR. MAYFIELD: NGNP is the first order of business. It is mandated in law so it sort of

naturally attracts --

MEMBER CORRADINI: Funding.

MR. MAYFIELD: -- bureaucrats' attention and funding.

MEMBER CORRADINI: The only reason I asked it like that is I know DOE has, because of their rethinking of policy with GNEP and all this sort of stuff, have diminished the third one on your list. But nonetheless, my understanding is they are going through a series of gap analysis, kind of like mini-PIRTs, on things necessary to actually push this forward relative to the licensing. And I guess I'd encourage if staff is aware of and is going to get copies of what they're doing.

MR. MAYFIELD: We are staying plugged in. There is a trilateral arrangement between the U.S., Japan, and France, looking specifically at sodium fast reactors. DOE invited us to go with them at the last meeting. Bill went with the team to represent U.S. interests. And the focus was they -- the trilateral move from a research activity to starting to bring the regulators to the table.

One of the themes we have been sounding with the Gen IV folks and others is it really doesn't serve you very well to develop a technology, develop

what you believe to be an adequate regulatory structure, without a single regulator in the room. So you might bring us along with you. And that's been gaining interest from the people pushing the technologies.

So when -- from the trilateral activity, there was interest in reaching out to the regulatory bodies from each of the three countries. We shifted some resources, made Bill available to take the trip. We have continued that activity and expect to be involved in the next trilateral meeting, which is some months away.

MEMBER CORRADINI: The reason I asked specifically about the sodium-fast reactor is that at least the French program, with the ASTRID design concept, the French safety authority is being pretty proscriptive as to what their demanding relative to requirements on a new version of we'll call PHOENIX.

MR. MAYFIELD: Right.

MEMBER CORRADINI: A new PHOENIX relative to void coefficients, relative to a number of things that -- I would just say more proscriptive. And I just want to make sure that staff here is aware of it.

MR. MAYFIELD: We actually have a couple of -- so yes, we share that interest. We have a

couple of entrees with the French in particular. One is the trilateral I just mentioned. The other one is through the MDEC activities, I think the Committee has been briefed on for the large light water reactor activity.

Through that interaction, there is continuing dialogue about having nothing forward, nothing concrete yet, but dialogue among the members about having a working group dealing with non-large light water reactor technologies.

Now they've talked about it. It just hasn't moved forward yet. Although we are looking at additional bilateral arrangements, sometimes multiple bilateral arrangements, looking at the same thing but it is moving. There is interest in the international community in sharing information, sharing regulatory insights.

MEMBER APOSTOLAKIS: The big problem they had was sodium leaks. It had nothing to do with reactor.

MEMBER CORRADINI: But -- yes, you're right.

MEMBER APOSTOLAKIS: There were other problems but that's why the reactor was shut down.

MEMBER CORRADINI: No, but you're thinking

super PHOENIX. I'm thinking --

MEMBER APOSTOLAKIS: Yes.

MEMBER CORRADINI: -- primarily with PHOENIX.

MEMBER APOSTOLAKIS: Yes.

MEMBER CORRADINI: But you're aware, you're aware.

MR. MAYFIELD: Yes.

MEMBER CORRADINI: Okay, fine.

MR. MAYFIELD: And we continue to have that --

MEMBER APOSTOLAKIS: Can we make the staff aware of more proscriptive regulations?

(Laughter.)

MEMBER APOSTOLAKIS: Sorry guys. They were lessons learned.

MEMBER BANERJEE: And what's the time scale that you are expecting? You said something like 2012 for certification requests or --

MR. MAYFIELD: Well, we're going to share with you, I think, a little bit more information as we go through the presentation on timing. But design cert applications, depending on how much credit you give to the optimistic views of some of the suppliers, some have said as early as 2011. I think it would be

late 2011 --

MEMBER BANERJEE: The difference --

MR. MAYFIELD: -- if it happens.

MEMBER BANERJEE: -- between the high temperature gas-cooled reactors and the sodium-cooled fast reactor, that this is in the world where sodium-cooled fast reactors are being built, 500-megawatt devices.

MR. MAYFIELD: Yes.

MEMBER BANERJEE: So that's a completely different reality scale.

MR. MAYFIELD: Yes. We agree. The interest in this country right now because of the Energy Policy Act, pushes high temperature gas a little further -- in fact a lot further than the sodium. However, there is commercial interest in the sodium-cooled fast reactors.

MEMBER BANERJEE: Because they're being built.

MR. MAYFIELD: Yes.

MEMBER BANERJEE: So it's sort of different.

MR. MAYFIELD: It takes you to a different world.

MEMBER BANERJEE: Yes.

MR. MAYFIELD: That's true.

MEMBER BANERJEE: They're a different purpose.

MR. MAYFIELD: With that, I think I'd like to turn to Bill and let him go through the NGNP activities.

MR. RECKLEY: You're received some information on NGNP over the course of the last couple years in that context, the research plan. So I'll try to go through these and just bring you up to date where things may have changed somewhat.

Just as background, and it's been mentioned several times here, NGNP is laid out in the Energy Policy Act with a schedule, with arrangements between DOE and the NRC. We developed a joint licensing strategy. And that was issued in August of 2008.

And we're all shooting for the timeline that's in the act, which would be operation by 2021, which, when you look at the licensing strategy, backs out to a COL application around 2013. I believe the members are familiar with the basic technology. Triso fuel, this is still the proposal so it's designs are still in play, Pebble Bed and Prismatic.

I guess one update that's worth mentioning

is that in the advanced test reactor in Idaho, they are currently doing testing. And the first test came back relatively -- I guess very successfully in that they made the triso fuel particles for the megaton pack, put them in the ATR, achieved the burnup that they were seeking to get without failure of the particles.

VICE CHAIRMAN ARMIJO: When will the decision be made, as far as you know --

(Laughter.)

VICE CHAIRMAN ARMIJO: -- I mean Prismatic and Pebble Bed, because they're really two very different reactors.

MR. RECKLEY: If you look at the last bullet on this slide --

VICE CHAIRMAN ARMIJO: Okay.

MR. RECKLEY: -- the DOE schedule is they went out last year with the funding opportunity that required the -- basically the three vendors to come in and make proposals.

They will be picking, in the very near future, perhaps next week, getting the announcement on the Phase I vendor or vendors.

VICE CHAIRMAN ARMIJO: All right.

MR. RECKLEY: The funding opportunity said

approximately two. So we look at it and feel that could be one, two, or three and still be approximately two. So we don't know that decision yet.

However Phase I is a relatively short activity for the development of a conceptual design. It goes out to basically the end of this fiscal year at which time there will be another funding activity and a selection for Phase II, which is the longer term program and the development of the NGNP reactor that would be built.

So in response to your question, I would say early 2011 is when we'll see it narrowed down.

MEMBER CORRADINI: To a design?

MR. RECKLEY: Concept.

MEMBER CORRADINI: Right.

MR. RECKLEY: The act calls for and the licensing strategy calls for it to narrow to a single design.

MEMBER CORRADINI: Okay. The reason I think Sam's asking that and we're all interested is last time, I think it was January of `09, the last time we had you guys -- I can't remember. Sometime in early 2009 when we had a group from, I think, both NRO and research or maybe just research, is that our comment back was you guys are being, in some sense,

set up because certain things are very much design specific, certain things are very much simply technology. Graphite, et cetera, et cetera.

MR. RECKLEY: Right.

MEMBER CORRADINI: So the earlier that you can -- the earlier DOE can make a design on a technical basis, the better off we all are.

MR. RECKLEY: We fully agree but we are where we are and right now we have to do exactly what you said, which is what can we do that's not necessary as dependent on either Pebble Bed or Prismatic. And there are some things that can be done.

MEMBER CORRADINI: Sure.

MR. RECKLEY: And in some cases, we're doing both.

MEMBER CORRADINI: Okay.

MEMBER BANERJEE: Doesn't Pebble Bed remind me also run a steam turbine?

MR. RECKLEY: One of the things I wanted to make on this slide was one of the things that's happened in the last year or so, maybe even since you've been briefed, is that the designs are changing.

They've generally gotten smaller. They're down on the order of 150 megawatts thermal. They had ranged between the vendors from 400 up to even 600 or

more. But they are coming down. And there is a convergence to around 250 megawatts.

The outlet temperature for the program has come down to around 750 degrees in order to clear some of the difficulties with the development and qualification of high temperature materials. And lastly, there has been a convergence that it will be steam cycle plant, not a --

MEMBER BANERJEE: Yes, nobody has ever been able to build a good end turbine. There is a small problem there.

MR. RECKLEY: So those things, I believe at least for the first plant or the prototype plant, there has been a convergence on that.

PARTICIPANT: Absolutely the right thing to do.

MEMBER CORRADINI: But then that -- I mean and that's independent -- I just want to make sure -- that independent of those designs you were talking about?

MR. RECKLEY: We're seeing that from the vendors.

MEMBER CORRADINI: Okay. So that brings up the generic issue of steam linkage into the --

MR. RECKLEY: Water intrusion comes back

in.

MEMBER CORRADINI: Yes, right.

MR. RECKLEY: Our current activities, we're -- we are evaluating our existing requirements, largely based on light water reactors, to see how they need to change to address this technology.

We're identifying significant policy and technical issues, both for HTGRs and where we can, and we'll talk about it a little later, where they cross over to other small modular reactor designs, and we're developing an overall licensing plan that includes a licensing approach and then coordinates with research being done by DOE, by the vendors, by our Office of Research, and lays out a plan as to, you know, what papers are we going to have to send up to the Commission, what other actions are we going to have to take in order to support the licensing schedule.

Near term activities, the DOE, through Idaho National Lab, are submitting papers for us to look at on approaches. These tend to be higher level. Some you will recognize right off the bat. Defense in depth, licensing basis event selection, safety classification -- it goes to Dr. Apostolakis' issue of how we're going to do this and what role PRA would play --

MEMBER APOSTOLAKIS: The LBE is, or for the members who are not very familiar, central to the technology neutral framework.

MR. RECKLEY: Right. Then other more technology-specific things like fuel design, high temperature material, qualification programs, and validation of the computer --

MEMBER APOSTOLAKIS: Are they doing a PRA?

MR. RECKLEY: They will. There are some that exist in various levels. But they will ultimately do one, yes.

MEMBER APOSTOLAKIS: But, I mean you can't really identify the licensing basis events without a PRA.

MR. RECKLEY: And they have done it in the past. They --

MEMBER APOSTOLAKIS: Who is they, by the way?

MR. RECKLEY: Well, PBMR, General Atomics --

MEMBER APOSTOLAKIS: Okay, okay, fine. It's not Idaho.

MR. RECKLEY: Right.

So in the near term, these white papers are what we'll be looking at for the next year or so.

MEMBER APOSTOLAKIS: So you do have those white papers? Is that what you said?

MR. RECKLEY: The first white paper we received was defense in depth. We expect most of the others in the summer, this summer.

MEMBER CORRADINI: So from a process standpoint --

MEMBER APOSTOLAKIS: Oh, very good.

MEMBER CORRADINI: -- I guess I just wanted to ask a process standpoint, so these come in. Are you treating these as pre-application information that you can then ask questions back to DOE as the -- I'll call them interim Applicant and say, you know --

MR. RECKLEY: Yes.

MEMBER CORRADINI: -- what does this mean?

MR. RECKLEY: Yes.

MEMBER CORRADINI: Clarify that. What does this system do?

MR. RECKLEY: Yes. In the end, the goal would be that we can write them back a response that says your approach or framework for how you will do mechanistic source term looks reasonable. And then whoever they pick will pick up that white paper and use that framework. And we will have -- we will be one step further than we would have otherwise been if

we had just waited for the vendor to do --

MEMBER CORRADINI: Good approach.

MR. RECKLEY: -- to do 2013 applications.

MEMBER CORRADINI: So let me ask this question. I'm sorry that I'm too interested in this. I'm worried about the fact that DOE spends all this money, Idaho does all this work, they pick a vendor and the vendor goes thank you very much but we're going to develop our tool, we're going to do our tests, we're going to develop our framework. And they use things over here.

Is this time well spent over here with DOE? That goes back to Sam's question about picking a design and getting a vendor involved with it.

MEMBER BANERJEE: Mike, that's a separate -- what can they do about that issue?

MR. RECKLEY: But the assumption, the assumption really is what DOE is doing is laying the groundwork and for the vendor not to take advantage of it.

VICE CHAIRMAN ARMIJO: The vendor would be --

MR. RECKLEY: They would have to pay for all that stuff.

VICE CHAIRMAN ARMIJO: Yes, the vendor

would be foolish to ignore what you've already --

MR. RECKLEY: Right, right.

VICE CHAIRMAN ARMIJO: -- I mean DOE is spending hundreds of millions of dollars to do this work.

MEMBER BANERJEE: Unless the vendor wants some DOE money.

MR. RECKLEY: They always do.

MEMBER CORRADINI: Gee, I wonder.

MEMBER APOSTOLAKIS: That's a good guess.

MR. RECKLEY: Right.

MEMBER CORRADINI: It's possible.

MR. RECKLEY: And, by the way, DOE is talking -- the vendors are playing in this game even now. And so it's not as if this is independent of that activity.

MR. MAGRUDER: Okay, thanks, Bill.

I'm going to take a few minutes and talk a little bit about the integral pressurized water reactors. That's a term that we're using for these small light water reactors.

I want to do a kind of a high, high level description of the designs that we've been looking at so far, talk a little about the interactions we've had with the vendors, and upcoming interactions.

So as you can see, the way we've defined this is designs that are -- use light water for cooling, in moderation have basically, you know, the steam generator, control rods, pumps that they have them all contained within a reactor vessel.

The three vendors that we are working with are listed there. They are listed in the order of the beginning of interactions with the staff, not in any priority order or anything.

From discussions with the vendors, it appears that their -- you know, at least their proposals, are that they will be in compliance with almost all of the GDC. There may be a few exceptions here or there but their goal is to license these plants relatively quickly and not push the envelope with new technology. There will be some exceptions. I'll talk a little bit about that. But that's the overriding message, I guess, we got from them.

I'm going to talk a little bit about schedules on the individual side. I will mention that we published a regulatory information summary, a RIS, a few weeks ago asking for an update from these vendors and any vendors actually that are interested in working with us on their schedules.

Next slide please. Let's start with the

Westinghouse IRIS design.

MEMBER CORRADINI: Can I ask a generic question?

MR. MAGRUDER: Yes.

MEMBER CORRADINI: Because you said some things about all of them in general. So I guess a few things. One, I'm curious about staffing. I've got a modular reactor that's 50 megawatts, 60, a hundred. Am I going to require a staffing plan that if I have three of these, I've got to have three separate staffs? I want to know how these things couple together because this concerns me relative to staffing requirements --

MR. MAGRUDER: Yes.

MEMBER CORRADINI: -- because you could drive the staffing up that these things are not at all of any interest.

MR. MAGRUDER: Yes.

MEMBER CORRADINI: The second thing is emergency planning relative to an EPZ zone. So, I mean, there's a number of generic things. Are you going to come to that?

MR. MAGRUDER: Yes.

MEMBER CORRADINI: Okay.

MR. MAGRUDER: Yes. Those are exactly the

things that we've been thinking about.

MEMBER CORRADINI: Fine.

MR. MAGRUDER: And hopefully the vendors have been thinking about as well. So that's a perfect intro.

The IRIS design, IRIS stands for International Reactor Innovative and Secure, that's the Westinghouse approach. They describe it as a PWR with a reactor vessel helical coil steam generators, reactor coolant pumps, and a pressurizer within a reactor vessel, which is enclosed in a spherical steel containment vessel. This is a -- as you can see -- about a thousand megawatt thermal plant design.

It's a little hard to read the labels on this slide here but there are eight steam generators and eight reactor coolant pumps within this vessel. At least that's the proposal.

MEMBER SIEBER: Where are the pumps? The pumps are in the vessel?

MR. MAGRUDER: The pumps are in the vessel.

MEMBER SIEBER: Up high?

MR. MAGRUDER: Yes, up high. Basically the difference with these designs is the primarily -- I mean the course at the bottom of the vessel there,

primary coolant flows up and then down through the outside of the core. In this case, the water is forced down. And the primary water is on the outside of the steam generator tubes for all these designs, which has a lot of advantages and some disadvantages.

MEMBER SHACK: We make steam in the tube this time.

MR. MAGRUDER: Yes.

MEMBER SHACK: Yes, that's a big plus.

MEMBER SIEBER: Just like burning coal.

MR. MAGRUDER: Yes, almost.

MEMBER SHACK: It is.

MEMBER BANERJEE: But what is this?

PARTICIPANT: It's got the tubes in the front I see.

MEMBER BANERJEE: Vertical steam generator.

MEMBER CORRADINI: And you have expertise.

MEMBER BANERJEE: Yes.

MR. MAGRUDER: The -- as you can see, they are proposing -- and actually all three of the vendors are proposing to use standard PWR fuel 17 by 17 design --

PARTICIPANT: Shorter.

MR. MAGRUDER: -- standard enrichment --

yes, they are just going to be shorter. Westinghouse has told us that their plan is to come in for a design certification. Best estimate right now of when they'll come in is mid to late 2012.

CHAIRMAN ABDEL-KHALIK: Is there a scale on this picture? Vessel height 45 feet or something?

MR. MAGRUDER: It's -- I don't have a -- I don't think I have a scale. It's relatively -- it's larger than the other design, let me put it that way. I have dimensions on the NuScale design, which we'll get to in a couple of slides.

That vessel is 60 feet tall by 15 feet in diameter. But this is larger than that.

CHAIRMAN ABDEL-KHALIK: This is larger.

MR. MAGRUDER: Yes.

PARTICIPANT: Higher powered, too.

MR. MAGRUDER: But I can't give you the specifics.

MEMBER CORRADINI: These are kind of like not Bs and not Ps. Somewhere in between in terms of operating pressures.

MR. MAGRUDER: Yes. They're --

MEMBER CORRADINI: They're not 2250.

MR. MAGRUDER: Right.

MEMBER CORRADINI: They're lower pressure.

MR. MAGRUDER: They're lower pressure.

MEMBER BLEY: You said the core is shorter than in a -- do you know how tall the core is?

MR. MAYFIELD: They're nominally half height.

MR. MAGRUDER: Yes, about --

MEMBER BLEY: Half height.

MR. MAGRUDER: -- about half height.

MEMBER BLEY: Okay. So that helps.

PARTICIPANT: Six or seven feet.

MR. MAGRUDER: Right.

MEMBER SIEBER: Looks like it would be a pain to refuel.

MR. MAGRUDER: Maybe.

MR. MAYFIELD: They talk about refueling strategies that they have that simplifies some of the problem. But it's --

MEMBER SIEBER: Well, it's tough to take apart.

MR. MAGRUDER: Yes.

(Laughter.)

MEMBER SIEBER: Maintenance is --

MR. MAGRUDER: You're right. And you can see that the refueling cycle for this proposal right now is three to three-and-a-half years. So they're --

you know, they --

PARTICIPANT: Consider this an issue, yes.

MR. MAGRUDER: -- more difficult to refuel.

MEMBER CORRADINI: It's been coming down. IRIS started at eight.

MR. MAGRUDER: Yes, yes. They've been working with some utilities. I mean there is obviously a trade off for a lot of different things you have to consider for when you refuel these reactors.

Next slide, as I mentioned, they were the first to come in and talk to us about a design. They came in actually in 2003.

MEMBER APOSTOLAKIS: Stewart?

MR. MAGRUDER: Yes?

MEMBER APOSTOLAKIS: Can you quickly tell me why these vendors are proposing these small reactors? Is it market driven?

MR. MAGRUDER: That's a good point.

MEMBER APOSTOLAKIS: Safer?

MR. MAGRUDER: They are -- they claim they are safer. We have yet to verify that. But a lot of it is market driven. The IRIS design, as the name implies, is a very international design.

MEMBER APOSTOLAKIS: I know.

MR. MAGRUDER: And as Mike mentioned earlier, there is a lot of interest around the world in smaller reactors both from an economic point of view from the --

MEMBER APOSTOLAKIS: Really international or just U.S./Italy?

MR. MAGRUDER: No, it's more than just U.S. and Italy.

MEMBER-AT-LARGE STETKAR: Well, Southeast Asia, for example, has a lot --

MEMBER APOSTOLAKIS: IRIS?

MEMBER-AT-LARGE STETKAR: Well, they have a lot of interest for smaller plants.

MR. MAGRUDER: Yes, but you were asking about the consortium specifically?

MEMBER APOSTOLAKIS: Yes.

MR. MAGRUDER: IRIS specifically.

MEMBER APOSTOLAKIS: Yes, the design itself.

MR. MAGRUDER: Yes, it's mostly Italian and U.S. But there are some other universities and companies around the world involved.

VICE CHAIRMAN ARMIJO: The international is Westinghouse and you say and Italian company?

MEMBER APOSTOLAKIS: Italian, yes.

MR. MAGRUDER: Yes. ENSA, ENEA, several Italian universities are involved.

MEMBER BANERJEE: But not Breda or Finmeccanica, none of the major Italian fabricators, right?

MR. MAGRUDER: Not that I know of.

MEMBER APOSTOLAKIS: MIT was involved. I Ansaldo involved?

MR. MAGRUDER: I don't know. They are using the SPES facility in Italy to do a lot of the testing. They've modified it now. It's called the SPES III.

They have submitted a couple of reports to us, which we have not really looked at. As we have mentioned before, you know, up until recently, our interaction with these vendors has been very minimal. We didn't have the resources to do much.

And we basically told them they could submit reports and we would look at them when we got the time. But we really haven't done much on these reports.

So we do have a report in house on emergency planning where they propose reducing the EPZ basically to the site boundary. And they cite, you

know, a lot of experience and a lot of good information in that report, which we have not officially reviewed yet. But that's a goal actually for many of these plants is to reduce the EPZs so they can be sited in a lot of different places.

MEMBER CORRADINI: But by the siting criteria, my understanding is no matter the size, five miles is the smallest. That's my interpretation of the regulation. Am I misinterpreting?

MR. MAGRUDER: Well, no, that's not quite true. There is -- there are exceptions written into the -- or the possibility of those exceptions are written into the emergency planning rule on a case-by-case basis.

MEMBER CORRADINI: Because the one that I know is La Crosse boiling water reactor, 50 megawatts electric, I still thought their emergency planning zone was --

MR. RECKLEY: It probably was as was Fort St. Vraine's. But the regulation allows us to do a case-by-case --

MEMBER CORRADINI: And they could ask.

MR. MAGRUDER: Yes.

MEMBER CORRADINI: Okay, thank you.

MR. MAGRUDER: I mean I think it is fair

to say emergency planning is probably more of a political issue than a technical issue.

VICE CHAIRMAN ARMIJO: Seismic isolators, that's interesting.

MR. MAGRUDER: Yes. Seismic isolators is an interesting topic. They came in and submitted a report on that. I mean their goal obviously is to isolate the whole NSSS essentially and try to take seismic out of the list of issues they need to.

Minimal recent interactions within them, the last meeting was in July of 2009 on the seismic isolators.

Next design to talk about is NuScale. This is the smallest of the three that we're looking at. As you can see, it's only 4,500 megawatt. Low pressure, this is a natural circulation design. No reactor coolant pumps.

Their proposal is kind of interesting. These are small modules. This proposal is to build a plant or their design certification would be for a facility with 12 modules and controlled by one control room. So the issue of --

MEMBER CORRADINI: Up to 12, right?

MR. MAGRUDER: Up to 12.

MEMBER CORRADINI: Right.

MR. MAGRUDER: But their proposal is to come in and certify a design for 12. And the applicants can build how many ever they want. As a matter of fact, one of their, you know, selling points is that the plant could be sited for 12 modules, the infrastructure could be built, at least part of it, and you could maybe bring in one or two modules, hook them up, start producing power. And then as you need more power or as you can afford to build more, you could just bring in more of these modules.

VICE CHAIRMAN ARMIJO: That's exactly what the old PRISM idea was 20 years ago.

MR. MAGRUDER: Right.

VICE CHAIRMAN ARMIJO: In that case, those guys were actually going to move the reactor modules around until they decided no, they'd better keep them unmovable.

MR. MAGRUDER: Well, NuScale actually is proposing to move their modules within a pool.

MEMBER CORRADINI: For refueling.

MR. MAGRUDER: For refueling, yes. They describe their design as an integrated reactor vessel enclosed in an air-evacuated containment vessel. So what you're actually looking there is both a reactor vessel and a containment vessel. And it is immersed

in a pool of water below grade.

Their best estimate proposal is to come in for a design cert application in early 2012.

VICE CHAIRMAN ARMIJO: Are they in the seismic isolation, too? Are all of these guys thinking about that?

MR. MAGRUDER: They are thinking about it. Their proposal is to have this -- the containment vessel supported on trunnions. And that would isolate the reactor.

MEMBER CORRADINI: But the whole thing, according to your cartoon, the whole thing sits in a pool of water. It's kind of like a trigger reactor that makes electricity.

MR. MAGRUDER: Yes.

MEMBER CORRADINI: A trigger reactor with a containment.

MR. MAGRUDER: Yes. And it's pool is obviously, you know, serves a bunch of different purposes.

This design actually started out of Oregon State which got some DOE funding from the MASLWR program, which you may be aware of, the multi-application small light water reactor. So they've done some work. They have a one-third scale test

facility built out there.

They have submitted some topicals to us, one on codes and methods, one on refueling operations. As I mentioned, their proposal is to actually move the vessels within this pool to do refueling.

They've provided some data to our Office of Research on updating the TRACE and MELCOR codes also, which has been helpful for the staff.

Significant interactions, several meetings over the last few years, most recently in the fall on the PRA and severe accident analysis. They have completed the Phase I PRA and they're going to do more work -- or Level One, I should say, Level One PRA.

Upcoming topical reports, they've submitted a list of interactions they'd like with us over the next couple of years. In the near future, they want to talk about human factors approach, their LOCA PRT and diversity in defense in depth.

MEMBER APOSTOLAKIS: Do you happen to remember who did the PRA for this?

MR. MAGRUDER: Yes, Dr. Medaris of Maryland.

I've seen reports in the press and I don't want to -- I'm only telling you what I've seen in the press --

MEMBER APOSTOLAKIS: Okay.

MR. MAGRUDER: -- but I know that Energy Northwest has been talking with NuScale about teaming up to use this design.

MEMBER BANERJEE: Do you have any idea when they may come in for certification?

MR. MAGRUDER: Yes, as I mentioned, they are planning to come in early 2012 with a design cert application.

MEMBER BANERJEE: And if Westinghouse comes, when would they come? Around the same time?

MR. MAGRUDER: Westinghouse is later in 2012.

MEMBER BANERJEE: Later?

MR. MAGRUDER: Yes, that's the best information to date.

MEMBER BANERJEE: Okay.

CHAIRMAN ABDEL-KHALIK: This is the -- when you say the outlook condition, 150 psig, 575, that's the steam condition? That's super-heated steam.

MR. MAGRUDER: That's for the -- for the mPower you mean?

CHAIRMAN ABDEL-KHALIK: For NuScale.

MR. MAGRUDER: Or NuScale rather? That's

the outlook conditions, yes. I think it is the outlook conditions of the core outlet.

CHAIRMAN ABDEL-KHALIK: It can't be, 150 psi saturation, 1,500 --

MR. MAYFIELD: They've got external turbines, turbine generators.

MEMBER CORRADINI: But I think Said's question is correct. I think that's a typo. It's 1,500.

MR. MAGRUDER: Oh, oh, oh.

CHAIRMAN ABDEL-KHALIK: Saturation temperature at 1,000 psi is hot.

MR. MAGRUDER: You're right.

MEMBER CORRADINI: Otherwise you've got a BWR there.

MR. MAGRUDER: Yes, the difference technically between IRIS and NuScale is very little. It is essentially a pressure range just below saturation in the core. Thank you.

CHAIRMAN ABDEL-KHALIK: It's just the pressure is wrong.

MEMBER BANERJEE: Then it might be boiling.

MR. MAGRUDER: Moving to the mPower reactor proposed by B&W, this is kind of size-wise in

between the smaller NuScale design and the larger IRIS design. You can see 125 megawatt electric is their proposal. A little bit longer refueling cycle.

They're thinking about -- they are talking about -- they're thinking about -- they are talking about a design cert application in mid-2012. So they're all around that same time frame right now.

MEMBER-AT-LARGE STETKAR: We're going to be busy.

MEMBER BANERJEE: What's the difference? I missed it. Could you go back?

MR. MAGRUDER: Sure. This design --

MEMBER BANERJEE: I have seen this design.

MR. MAGRUDER: It has one -- I think they call it -- they don't call it a reactor coolant pump. They call it --

MEMBER CORRADINI: Circulator.

MR. MAGRUDER: -- circulator, thank you. One steam generator, you know, very tall, thin vessel. The goal of mPower and NuScale is to be able to manufacture the vessels within the U.S. and ship they by rail around the U.S.

So these facilities would be manufactured in a factory.

MEMBER BANERJEE: You mean there are and

heavy forging plants left in the U.S., Stu?

MR. MAGRUDER: Sure. Yes. For this size there are.

VICE CHAIRMAN ARMIJO: For real small stuff, yes, we can do that still.

MR. MAGRUDER: And that's gotten a lot of interest from Congress as well, you know the fact that they can be manufactured in the U.S.

MEMBER BANERJEE: It's time we built a few real heavy forging plants.

MR. MAGRUDER: Let's see, the mPower, they actually started talking with us just last year. This is based on the B&W design at the old German ship, the Otto Hahn. They had actually operated for many years.

MEMBER BANERJEE: They had refueling every three or four years on this ship?

MR. MAGRUDER: I don't know how often they refueled that ship.

MEMBER BANERJEE: That would be strange for a naval ship.

MR. MAGRUDER: Yes, it was a merchant ship. It wasn't a naval ship.

MEMBER BANERJEE: Oh, okay.

MEMBER CORRADINI: Like the Savannah.

MR. MAGRUDER: Yes.

MEMBER BANERJEE: All right.

MR. MAGRUDER: Of note on this design is that they are proposing an option for an air-cooled condenser. Ultimately the heat sink would be here or could be here for this design, which would obviously open up a lot of other -- a lot more sites in the country.

A lot of recent interactions with them. The latest meeting was in October on several issues. And there is another meeting about to schedule for the end of March where they're going to come in and talk about their ECCS design, integral systems testing plan, and some of their thermal hydraulic codes.

You may have seen there was a Wall Street Journal article a few weeks ago that mentioned that they have signed an MOU with TVA, First Energy Corp., and Oglethorpe Power Corp. And I understand that they are going to be meeting next week to start talking about interactions and facilitating the approval of this design with the NRC.

MEMBER BANERJEE: There has been talk about sort of more no-touch designs in the press like with much longer periods between refueling. Is there any sort of interactions you've had with any vendors or anybody --

MR. RECKLEY: I'll get to that in the next slide.

MR. MAGRUDER: The way we've broken up the ARP is Bill has all the non-light water designs and I have the light water designs.

MEMBER BANERJEE: And there are no light water designs which are more naval with more --

MR. RECKLEY: No, not at this time because the enrichment to drive that would be --

MEMBER BANERJEE: Too high.

MR. RECKLEY: Right, yes.

MEMBER CORRADINI: Too high or require a whole bunch of front end fuel cycle facility -- I call relicensing.

MEMBER BANERJEE: Yes. Yes, yes, and yes.

VICE CHAIRMAN ARMIJO: Yes and yes.

MEMBER CORRADINI: I thought just the second one was yes.

VICE CHAIRMAN ARMIJO: No, there are a lot of yeses. It's a big barrier.

MR. MAGRUDER: Okay, next slide please. My final slide is just to talk about the current activities. As we've mentioned, we're looking at the existing requirements, doing gap analysis for areas that we think we need to focus on.

You mentioned some of them already, you know, the staffing issues, the EP issues, human factors, how to deal with multi-modules out of sight --

MEMBER CORRADINI: I guess the other one that crossed my mind was some of these use construction. Maybe this is an old thing for NRC but to have these things close enough in proximity to have one operating and one being built.

MR. MAGRUDER: Yes. We're definitely thinking about that.

MEMBER RYAN: Are there any projections on these designs regarding waste? High level? Low level? What kind of waste are they looking at? Or are they at that stage yet?

MR. MAGRUDER: Standard, same as the current plants for the IBWRs, it will be high level waste, I think.

MR. MAYFIELD: But there's also been discussion from at least two of the vendors that they would store the -- the pool size would be such they would store the full 60-year operating life in a pool at the facility. And then deal with it subsequently.

MR. MAGRUDER: Right.

MR. MAYFIELD: There are a number of

strategies that will be discussed, I'm sure, as they come in for design certs.

MEMBER RYAN: Okay, thanks.

MR. MAYFIELD: Sure.

VICE CHAIRMAN ARMIJO: So seismic isolation could be generic? Is that a technology that the NRC would start looking into?

MR. MAGRUDER: Yes, we will start looking at the proposals. I don't know that mPower has talked about seismic isolations. I know that IRIS and NuScale have.

VICE CHAIRMAN ARMIJO: But different approaches.

MR. MAGRUDER: Different approaches, yes, yes.

Okay, Bill?

MR. RECKLEY: I'll try to quickly go through all of the other material. It's, in many respects, interesting still but we're not as active in these areas.

As we mentioned, sodium fast reactors are being pursued so it's not something that we can just let go without paying any attention. But we are, both in the Office of Research and in the Office of NRO, only doing a limited amount of work in regards to fast

reactors.

We are continuing to develop a knowledge management system, trying to capture previous work that we've done on PRISM and safer international activities such that as we gear up, we'll have some of the tools available to us in our knowledge management systems.

We are having some pre-application interactions and I tend to divide the fast reactors into two groups. The one is 4S. And these are the smaller units aimed at remote locations and they tend to operate for a long period of time. But the target audience is remote-location kind of customers.

And then the other group being those that could tie into closing the fuel cycle. And those would include PRISM, General Electric's PRISM design as well as some of the other international designs coming out of the Europeans or Japanese efforts.

And going into that, then the last bullet, we do, on a limited basis, go to international meetings just to follow what's going on, not only in the trilaterals but also what's going on in Russia, and India, and other places with very active fast reactor programs.

MEMBER BANERJEE: Has China got one under

construction, too?

MR. RECKLEY: I think so.

MEMBER APOSTOLAKIS: Yes, I think they are building one.

MEMBER BANERJEE: I think India and China are actually --

MR. RECKLEY: Yes.

MEMBER CORRADINI: Well India has -- India is in the process of -- they already installed their core and they are about to be moving their steam generators in place.

MEMBER BANERJEE: Yes, the safety issues there are interesting though. They have to do with the potential for pulling a little bit -- you know, these fast designs. They have a free surface. And the amount of air or the cover gas that they might be pulling down is one of the major safety issues there, which is --

MEMBER CORRADINI: It was in the pool designs.

MEMBER BANERJEE: Yes, I think it was also in the French one. They had this problem.

MEMBER CORRADINI: And the Japanese.

MEMBER BANERJEE: Yes, they saw anomalous voiding in the core. So that's sort of interesting.

And they have, of course, void coefficient.

MR. RECKLEY: Yes. And we're trying to follow, again, trying to balance out, trying to stay informed at the same time not being -- not have many resources.

Then the last category of our technology groups is just everything else. You may have saw General Atomics announce week a development of a design for a gas-cooled fast reactor, EM2, energy multiplying module, or something, I think, is the name.

The only other category of the Generation IV designs that we've actually heard about here in a commercial sense, other than high temperature gas and sodium fast reactors. The Hyperion is a lead bismuth design similar to SSTAR that was developed at the National Labs that they are proposing. Some work, although we're not doing anything in the area of accelerator-driven systems or fusion or fission fusion.

MEMBER BANERJEE: What is the Hyperion? Can you just --

MR. RECKLEY: The Hyperion is a lead bismuth -- we have limited interactions with them. We have yet to have a detailed design meeting. They

say maybe later in the year. But the basic design, based on what we know, is a lead bismuth --

MEMBER BANERJEE: Homogenous or --

MR. RECKLEY: Lead bismuth with uranium nitrite fuel. Again, based on what I've been able to hear them say and look, I compare it with the SSTAR design that I think was developed primarily by Lawrence Livermore in Argonne Laboratories as part of the transportable reactors for military applications.

MEMBER CORRADINI: Like a battery, it's like the battery design. A lead-cooled battery design by Argonne. Dave Waite's group.

I guess I'm curious about -- just from -- if you go back a slide, just from if you had 100 percent of your time -- if you had 100 hours, how would you -- taking NGNP out of it, how -- I guess what I'm trying to ask is can you give me a feeling for -- are you just watching these things other than NGNP?

MR. RECKLEY: Yes.

MEMBER CORRADINI: Okay.

MR. RECKLEY: Well, no. Let me just say, the integral PWRs and NGNP are basically 50-50 roughly. And then everything else is some fraction.

MEMBER CORRADINI: That's all I wanted to

make sure. Thank you.

MR. RECKLEY: Now one of the things that we've talked about is building the infrastructure. And Mike went into the organization. We're getting contracting vehicles in place, arranging for training of the staff.

The other big area that we're doing right now is to try to identify where issues go across the technologies. And if they don't go all the way across all technologies, are they at least going across technology groups? So we're trying to minimize how many times we look at an issue in order to resolve it. And, again, NRO's theme, you know, one issue, one review, one position. So we're trying to maximize that even across technologies if we can.

Some of these have already been mentioned. Emergency planning, physical security, staffing requirements, even financial and modular. If you look at all of the designs, what we're going to try to do is to see if we can characterize them in terms of attributes such as source terms, how long does it take a severe accident to progress, driving forces, pressures, whatever, look at a number of attributes and say okay, these things have enough in common that we can come up with an approach in emergency planning

that goes across all the technologies. Or not.

That will say whether something is generic or something we'll have to pursue a design or technology-specific approach. But, again, most of these things go to those kind of inherent features and mitigating systems. And do they support things like you have much more time to respond? So you can then use that in arguments for both staffing and emergency planning.

So that's -- really, we're just kind of defining those attributes now. And going forward to see how this might play out.

MEMBER RYAN: How do things like outages, expected and unexpected, and radiation protect practice and all that fit in. Those can be fairly generic programs, I guess.

MR. RECKLEY: Right. And similar to that would carry over pretty much from the light water and existing technologies. I mean you are going to have to do certain things as you get into the technologies.

You know gas cooled is going to have different -- some differences in the radiation protection program and light water reactors will. But programmatically it will carry over relatively well from the existing regulations in addition to the

current practices.

MEMBER RYAN: Are you sure?

MR. RECKLEY: Well, I think.

MEMBER RYAN: I mean I understand what you're saying but I'm not -- that doesn't strike me as something I would just accept up front.

MR. RECKLEY: Well, we'll get into it and some of this we will see as the vendors come forward what kind of -- I mean obviously --

MEMBER RYAN: You'll need detail to get into it.

MR. RECKLEY: Yes, they're going to come forward. And they're going to making proposals on waste systems and other things. And we'll see how it plays out.

MEMBER RYAN: Yes, that was the other one I was going to ask. The waste system are going to be seeing a lot of that action anyway.

MR. RECKLEY: Yes. And obviously that design on a gas-cooled reactor is going to have a different waste systems and different concerns in terms of radiation protection than even a prismatic or some of the others.

MEMBER RYAN: One last question on the Pebble Bed, that tends to be pretty hot stuff coming

out of the reactor. How about shipping and transporting the spent fuel around?

MR. RECKLEY: They have proposals. I must admit it is not an area I've looked into very much at this time.

MR. MAYFIELD: Some years ago, Bill Brock and his colleagues in spent fuel looked at a cask design -- that was a while back -- but they looked at a cask design for Pebble Bed and concluded that yes, it could be accommodated.

MEMBER RYAN: Oh, okay.

MR. MAYFIELD: But that was then and this is now. So we're --

MR. RECKLEY: Right. Not necessarily that we have a design before us right now but just looking at it enough to say it is a technical problem that can have a resolution.

MEMBER SIEBER: It looks at though several of these designs sort of push the envelope on materials issues. Is there enough of a database, for example, in the higher temperature ranges for one to determine the adequacy of materials? And secondly with four- or five-year intervals on refueling, the opportunities to survey all and otherwise inspect materials, it looks like it is going to be an issue to

me.

MR. RECKLEY: For a lot of the light water reactors, actually they're cooler and lower pressures in most cases.

MEMBER SIEBER: Well, 636 for two of them which is above the Inconel threshold.

MR. MAYFIELD: But by and large for the integral PWRs, the Westinghouse, NuScale, mPower, we're in reasonably good shape in terms of the technology, the information databases.

MEMBER SIEBER: Yes.

MR. MAYFIELD: The surveillance, in-service inspection, in-service testing intervals, are something where the vendors have noted they have to come and deal with it. But they have strategies.

When you really start pushing some of the designs that are wanting to go significantly longer, that is an area where we would anticipate some active discussion with the vendors if and when they bring us --

MEMBER SIEBER: Well, I think it is going to -- there is going to need to be a larger body of research that --

MR. MAYFIELD: Right. And we would completely agree.

MEMBER SIEBER: The other issue in the materials issue is I would presume that some of these designs end up with relatively high burnup levels in the fuel. No?

MEMBER CORRADINI: No, at least the ones -- the point designs -- all of these are point designs, I guess, and my impression is at least with some of these, they've de-rated -- their linear powers are actually relatively low. So their burnups over their three years is less than you would first imagine.

I think in NuScales, they are only like 40,000 megawatt-days per ton, for example.

MEMBER SIEBER: Yes, which is --

MEMBER CORRADINI: Gas reactor burnups are going to be a bit higher. But the light water ones are, in some sense, they are de-rated. They are pretty conservative in their operating parameters.

MEMBER SIEBER: It just didn't seem that way. They cut the assembly height in half and only put 12 in --

MR. MAYFIELD: But the other thing --

MEMBER SIEBER: -- for five years.

MR. MAYFIELD: -- yes, the other thing that the three integral PWR vendors have all emphasized, recognizing we have yet to see the

application, but the going-in proposition of the staff is they are not seeking to push licensing boundaries. They are seeking to get ease of licensing and move on to getting the units installed and operating. That's the going in premise. We'll see how that plays out.

MEMBER SIEBER: That's today.

MR. MAYFIELD: Yes. That's the going-in premise. And we'll see how that plays out. I agree that's where they are starting. How that will modify over time --

MEMBER SIEBER: Well, the economies of operation strive for the highest burnup you can achieve without everything falling apart.

MR. MAYFIELD: Okay, Bill.

MR. RECKLEY: Okay. Thanks.

So those were the generic issues. And just as we were talking, there will be technology-specific issues, materials qualifications, fuel qualification among them.

How we're looking at prioritizing, there is a large number of issues and how to decide which ones to attack first, obviously safety significance is the driver. Then we go down, again trying to maximize efficiencies here, how many technologies or designs are effected. And we'll look at those that go across

the Board.

What is the impact of the issue on the design? And so if we're looking at a generic issue that has a high probability of fundamentally changing a design, that's one we have to look at first let's say versus emergency planning, which would be a COL kind of concern, important to the economics, but may or may not actually change the design of the facility.

Method of resolution, if we're looking at changes to Price-Anderson, that requires us to go to Congress, which means we have to be doing it -- probably we're already late. But it moves up its priority just because the method of resolution takes a long time.

MEMBER CORRADINI: I guess can you expand?

MR. RECKLEY: Yes.

MEMBER CORRADINI: I don't appreciate that one. Could you explain that one?

MEMBER BANERJEE: The ramifications are not clear. What is it?

MEMBER CORRADINI: I assume it has to do with their insurance policy grant.

MR. RECKLEY: Well, there's two -- there are a couple of factors. One, the way Price-Anderson and our implementing rules are structured, if you

don't -- if your tower is less than 300 -- I'm looking at Don because he probably remembers the number -- 300 megawatt electric, then you fall into the first category and it's all the standard numbers that apply.

And then if you don't meet that, then you fall down into a second category where there is a calculation of what is needed. We need to look at that because those were developed with different reactor sets in mind.

Even in the first one, we need to look because it is phrased in terms of megawatt electric wherein in the gas-cooled side, we're talking about processes applications where there may or may be an electric generator. And so we just need to look at a number of issues to see how it lines up.

MEMBER CORRADINI: Okay. Thank you.

MR. RECKLEY: It may be okay. But it may not.

Industry participation, what kind of cooperation are we going to get from the industry on some of these issues? There are a number of things going on. NEI is beginning to be involved in these although they clearly state this is not their highest priority.

There is an American Nuclear Society

Special Committee that's looking now at some of these issues. And we're participating. And we'll see what comes out of that effort.

Then the other factors are kind of the schedule things. What -- you know, how might the generic issue effect a deployment schedule of either a prototype or commercial plant?

And then lastly, the dependencies. Some of these will depend on items like source term. And until the work is done on mechanistic source term, we may not be able to progress all the way to completion on an item like emergency planning. So we'll just have to lay out and kind of have a plan as to how this plays out.

MEMBER BANERJEE: So if there are some concepts which require adjustments to the GDCs to begin with, how would you handle that?

MR. RECKLEY: Well, for the first-of-a-kind plant or the prototype under NGNP, we'll use exemptions and imposition new requirements for that specific license. Then as --

MEMBER BANERJEE: Okay.

MR. RECKLEY: Then if it appears that there is a prospect for commercialization, we'll look to changing the regulation so that, you know, all

future plants would not be based on exemptions and impositions, that the rules would be set to support that commercialization effort.

But for the -- we don't have in place for the first-of-a-kind plant the rule changes that may come later. We would do that on a case-by-case basis.

MEMBER BANERJEE: So something like the fast reactor with the positive void coefficients, you are going to try to get an -- they would try to get an exemption on that?

MEMBER CORRADINI: Well, if they were licensed -- I was just going to say -- I'm sorry but I can't remember the one --

PARTICIPANT: Clinch River.

MEMBER CORRADINI: -- Clinch River was licensed under Part 50.

MR. RECKLEY: Yes. So we write an SER.

MEMBER CORRADINI: It made it enough through the system that I thought that these sorts of questions were answered.

MR. RECKLEY: They were, yes.

MEMBER BANERJEE: Okay. So you have a prototype there?

MEMBER SHACK: PRISM you may have heard once before.

MEMBER CORRADINI: Well, what about FFPF?

MEMBER SHACK: That wasn't an NRC license.

MEMBER CORRADINI: FFPF.

MR. RECKLEY: FFPF --

MEMBER SHACK: But did it have the positive void coefficient?

MEMBER CORRADINI: Yes. But it went through DOE rules. I don't think it appeared here.

MEMBER BANERJEE: No, DOE rules are completely different. Yes.

MR. RECKLEY: Okay, last slide. What we would envision as future ACRS interactions, we have one coming up in a month where the Office of Nuclear Regulatory Research will be done to talk about the HTGR research plan. This is our plan to support NGNP.

Then we would be back on some of the policy issue in terms of writing papers or Commission policies or approaches. And we would be back to get the advice and, in some cases, probably letters from the ACRS on those proposals.

We're talking about applications in the 2012, 2013 time frame. So we can talk to your staff and have pre-application kind of briefings. These are probably ones where the vendors would come in and participate a little more so.

Then shortly thereafter, we're going to be in the design mode. And so we'll get into the traditional interactions of SER with open item and SER meetings.

And then lastly whenever you guys decide you want to or I guess whenever we think we would benefit and we'd ask and try to come before you.

So we'll start to talk to the staff. I mean some of these, the middle ones, the pre-application briefings and so forth, we are talking, you know, a couple of years from now, 2012. But it's not too early to start to think about how we would fit those into your schedules and what other licensing reviews you are going to have at the time and all of that.

MEMBER BANERJEE: Well, we are going to need a lot more time with some of these concepts because they are very unfamiliar. There needs to be a lot more sort of background built up.

MR. MAYFIELD: Well, the other thing to not lose sight of is the going-in assumption is that we're going to see NGNP as sort of a first activity, followed or in parallel with the integral PWRs. The other technologies, the ones that will be more challenging to develop infrastructure, to settle

policy issues, will be staged somewhat later.

So frankly there just aren't enough resources for us to take on no matter how much money Congress might give us. There just aren't enough technical resources to take all of these things on in parallel. It's just not feasible.

So we expect that there will be some sequencing of activities so that we are not faced with all of these things at the same time. And we have some control over how that happens with support from the Commission.

This is starting to move fairly quickly. Commissioner Svinicki, in other contexts, has cautioned the staff -- or urged the staff to remain nimble. For an old guy, this nimble thing is a challenge.

I just -- anecdotally --

MEMBER CORRADINI: I saw you with your running shoes on last night.

MR. MAYFIELD: Yes, but I wasn't running very damn fast.

(Laughter.)

MR. MAYFIELD: The -- just to give you a sense of how quickly this is evolving, a year ago we didn't know there was an mPower. Okay? We hadn't

heard of it a year ago.

So this is evolving very quickly. And one of the things we are doing and actually the industry is starting to do this same thing, is introduce some stability. We have no intention and the NEI mantra is that these designs don't become a distraction from licensing the large light water reactors.

We are completely on board with that notion. At the same time, we need to move forward and meet this need. So there is a balancing act that we will be performing.

And we would ask the Committee to try to be as nimble as we are. I submit to you --

MEMBER CORRADINI: Nimble? We're all old guys, too.

(Laughter.)

MR. MAYFIELD: That won't be much of a challenge because we're not moving very fast these days.

MEMBER CORRADINI: So I guess I had a question that isn't any of these reactors but I keep on reading about it which is the concern about medical isotopes and the Markey bill coming in with potentially two applications, one in a research reactor for commercial production of medical isotopes

and B&W coming in with an aquaeous reactor. Where does that fit?

MR. MAYFIELD: That fits in NRR under the Research and Test Reactor heading.

MEMBER CORRADINI: Not you guys?

MR. MAYFIELD: It's not us.

MEMBER CORRADINI: Thank you.

MR. MAYFIELD: No, we're power reactors.

MEMBER CORRADINI: And Research -- that's right, even though it would be a reactor --

MEMBER SIEBER: Is that NRR?

MR. MAYFIELD: It is NRR.

MEMBER CORRADINI: Thank you.

MR. RECKLEY: They actually changed the name of one of their branches to Non-Power Reactors.

MEMBER CORRADINI: Thank you.

MEMBER BANERJEE: So can I just sort of ask just when you expect this certification requests to come in, which is 2012, what would be your staffing levels in rough terms? Will you be able to handle all of that?

MR. MAYFIELD: All three of them at the same time plus NGNP, the answer to that is no.

MEMBER BANERJEE: You said three of them.

MR. MAYFIELD: Well, there are three that

have said they wish to come in.

MEMBER BANERJEE: Right.

MR. MAYFIELD: How that actually sequences, we'll see. It is unrealistic to think that we will have sufficient staff on board or resources made available to us to do all three of those plus NGNP. That's not likely.

What we have seen is just a natural progression of things from the industry where you have plans and good faith commitments but the reality overtakes it. And there is a natural sequencing that happens.

We're anticipating a similar thing here. We'll see how it actually plays out. Worse case scenarios for us is they all three show up as projected. We'll see.

We would anticipate some technology down-selecting from the Department of Energy, some support there. We would look to NEI to also help us -- NEI and the industry to help that sort of sequencing.

The approach we are taking with the advanced reactor reviews is we will matrix the organization. NRO is pretty strongly matrixed to begin with. We will continue that activity. We are a project management organization in the advanced

reactor program.

We are reaching out to the existing engineering systems divisions within NRO to provide the technical review support. We will also leverage contractor resources significantly as we go forward. And that is starting, we think, imminently.

So will we be ready, would we be ready to deal with NGNP plus all three integral PWRs, the answer is no. Will we be ready to deal with NGNP and perhaps two of them, I think the answer to that -- just given the sequencing we're looking at, I think the answer to that is we can handle it.

Gentlemen, that's all we had. I will be happy to come back and visit with the Committee at your request and certainly as we start moving some of these issues forward.

MEMBER BLEY: Thank you very much for the briefing. Anything from members?

(No response.)

MEMBER BLEY: Thanks very much.

Mr. Chairman?

CHAIRMAN ABDEL-KHALIK: Thank you. At this time, we will recess for lunch. We will reconvene at 1:00 p.m. and then we'll get back on the record at 1:30 p.m.

(Whereupon, the foregoing matter went off the record at 11:54 a.m. to be reconvened in the afternoon.)

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

1:28 p.m.

CHAIRMAN ABDEL-KHALIK: Our next presentation is a meeting with the NRC Executive Director for Operations. We are fortunate to have with us the EDO and associates. We're glad to have you here. We are very pleased to have you and look forward to hearing your presentation.

MR. BORCHARDT: All right. Well, thanks, thanks for the invitation.

CHAIRMAN ABDEL-KHALIK: Sorry you missed the lunch but --

MR. BORCHARDT: Yes, well we'll reschedule that. It looked like it was going to be a little bit of a cramped lunch to get back in time. So I think it will work out better to have that in the spring or something.

CHAIRMAN ABDEL-KHALIK: Thank you.

MR. BORCHARDT: And thanks very much for the invitation. I think it has been quite a while since the EDO been before the ACRS. And I've been in the position for almost two years now. So it's my first time in this capacity.

So what we were hoping to do is just to provide a very broad overview of NRC activities from

our perspective, give you some context. I don't think we're going to talk about any issue in enough detail to satisfy the ACRS, especially not any technical detail.

But I think by the overview, you get an idea of what is going on in all of the program areas that fall under our purview. And it will give you some context for where the technical issues fall and the review activities.

If I was to look at the current situation that we're in now, I think I would list five priorities that I have. Number one has been, always will be for the end of time, the safety of the current licensees. We spend a lot of time and there is a lot of attention given to new reactors.

And Bruce is going to talk a little bit about that, improving infrastructure, and Darren is going to talk about that, and Marty will talk about things in the waste area. But we start and end every single day with a focus on operating reactors. So, I mean, and that's first and foremost, always will be.

However, to round out my top five, it's the new applications. And it's not just the new reactors because there are new applications throughout the fuel cycle that are getting a lot of attention.

And increased resources.

Third -- and these aren't necessarily in priority order other than the first one -- is human capital issues. I'll mention that we have about 50 percent of the staff has been with the NRC for six years or less. So that brings along with it some training challenges, some knowledge management, knowledge transfer challenges that I think we're doing a very good job of. We're bringing on some incredibly motivated, very skilled and knowledgeable people. But nonetheless --

MEMBER SHACK: Can I just ask how is that split between headquarters and the regions? Is that split the same?

MR. BORCHARDT: Yes, it's roughly the same. Yes, I'm not aware of any significant difference. The numbers that I look at tend to be Agency-wide.

MEMBER SHACK: So everybody is growing.

MR. BORCHARDT: Yes. We had about a four percent attrition rate over the last year. Most of the growth over the last six years that took us from about 3,000 to about 4,000 staff, most of that was in headquarters. But there was a good number of people in Region II because that is our construction center

of excellence for new reactors.

But that number of, you know, 50 percent roughly being six years or less is pretty much Agency-wide.

CHAIRMAN ABDEL-KHALIK: And the attrition, the four percent is mostly on the experienced end of the scale?

MR. BORCHARDT: Oh, yes, of course. Yes, it's mostly retirements. I mean we're the number one federal agency in which the work in the government, people actually do like working here.

And so we have very few attritions to go to other government agencies. I mean there are some for personal reasons because of location, people, you know, spouses transfer, that kind of thing. But very few leave and go to work somewhere else compared to other government agencies.

So most of those are retirements. You look at the near-term retirement list, there may be ten or 12 people on that list right now. I don't think there is a single one with less than 30 years.

MEMBER CORRADINI: Just out of curiosity, have you ever investigated the reasons for that? Is it that there is less stress here? Or more stress other places? Or what's the environmental conditions

that have caused that? Do you know what I'm asking?

MR. BORCHARDT: Yes.

MEMBER CORRADINI: Do you do root cause analysis of --

MR. BORCHARDT: We do. We don't want to look too hard because we don't want it to change, you know. We like the current results.

But I mean I think we do exit interviews with every single person that leaves the Agency. And we do -- the IG does safety culture surveys every couple years. OPM now does a survey. In fact, it's out before the staff now, every single year that looks at quality of life issues, training opportunities, career development issues.

And on all of those, NRC ranks exceptionally high. Either number one or number two in every single category that is evaluated as part of those surveys. I think that's largely the reason.

There are some others that aren't quite so defined in these surveys -- really my opinion maybe. But I think we have a very important but easy to understand mission. So people can get their head around why we are here and really get on board with it.

I mean they are enthusiastic about how

they contribute to the mission. And I think that's one of them. And the location, you can't beat. I mean there's actually a physical benefit to not being inside the beltway. It's easier to get to work for most people.

I think the aggressiveness of our Flexiplace, you know, the programs that we have for work hours and those kinds of things, makes people enjoy the opportunity of working here. So I think it is a number of factors. But --

MEMBER CORRADINI: Okay. Thank you.

CHAIRMAN ABDEL-KHALIK: Back to the attrition issue, you say most of the people are retirees.

MR. BORCHARDT: Yes.

CHAIRMAN ABDEL-KHALIK: Don't you have a probationary period for new employees? Does that imply that very few, if any, are actually let go after the probationary period?

MR. BORCHARDT: Yes, actually it is very few. It is a two-year probationary period for new employees.

We have a very aggressive training or hiring program, if you will, in that -- and again, in contrast to many other federal agencies, our

supervisors go out and do the recruiting and hiring. So it's not like we have a human capital -- human resources department that goes out and hires somebody and it's not really a good match. That supervisor knows the individual before they come on board.

So there is a, you know, very close relationship. And we're doing a lot to improve our on-boarding process. It's now automated. It's being rolled out. If it hasn't been rolled out in the last couple of weeks, it will be soon, to help people get acclimated into the NRC in a more -- even before they get here. So this human capital knowledge management is a big deal for us.

Infrastructure upgrades is probably the number four item that I would list. And Darren is going to talk a lot about that.

But ADAMS is ten years old. It is getting antiquated. It's getting harder to do work. I mean some would argue it's never been easy to use ADAMS.

(Laughter.)

MEMBER CORRADINI: We would never say that here.

MR. BORCHARDT: That's not my official position, all right. But there's a lot of places where we have not invested the necessary capital to

keep up to date with those things. And we're having to do that now. So that's why that's high on the list.

And then my number five item is something that probably won't be there a year from now but because of the recent changes having to do with Yucca Mountain, the spent fuel integrated management issue is up high on my list because we now need -- are faced with the situation of considering dry cask storage for longer a time period that what we had originally anticipated. So it is going to have to result in some kind of an expanded research program and different analysis to justify what some future approaches might be.

So if we can go to the next slide please.

MEMBER CORRADINI: Could I ask about the last one?

MR. BORCHARDT: Yes.

MEMBER CORRADINI: So you really think in a year at least from the standpoint of spent fuel management, you'll have it sorted out here?

MR. VIRGILIO: Well, I'll actually get into that in my presentation.

MEMBER CORRADINI: Okay.

MR. VIRGILIO: And I'll tell you the

components of the program and sort of the timeline.

MEMBER CORRADINI: Okay. Fine. Thank you.

CHAIRMAN ABDEL-KHALIK: Who is manning the slides?

MR. BORCHARDT: Yes, I did. Next slide please. There we go. Okay.

So I'll, in a couple of minutes, just wrap up the overview. Bruce Mallett, Dr. Bruce Mallett, has been the Deputy EDO in Charge of Reactor Programs for three years now. Unfortunately for us, he is going to be retiring in June. He's one of the attritions.

(Laughter.)

MEMBER APOSTOLAKIS: You will interview him to find out why?

(Laughter.)

MR. BORCHARDT: When you see me stab him in the leg, you'll understand what the problem is.

(Laughter.)

MR. BORCHARDT: And actually on Monday we'll be announcing Bruce's replacement. So we're doing that well ahead of time so we can have good knowledge transfer for his replacement.

MEMBER SHACK: Work out a little pool.

See if there are several going.

MR. BORCHARDT: Marty Virgilio is in charge of the Materials Program. He's got the longest title in the office.

And then Darren Ash, he came -- Darren came with outside NRC experience. He's been with the NRC how many years?

MR. ASH: 2007. Almost three years.

MR. BORCHARDT: Three years now but is in charge of the corporate support part of the staff.

Next slide please. So the budget for this year is about a billion dollars, which is starting to talk about real money.

The dilemma that we, the four of us, and the Commission have is that about 70 percent of that billion dollars is fixed costs; 60 percent roughly is salaries and benefits and then another ten percent or so, a little bit more than ten percent really is what I would call the fixed costs of keeping the lights on, paying the rent, building infrastructure, keeping desktop computers on everybody's desk, those kinds of things.

So within that billing, there's only about 300 million that there is any flexibility whatsoever. But then once you start to consider kind of the

mandatory work of maintaining the licenses for the 104 operating reactors and the materials licensees, then that kind of not-so-discretionary work consumes the bulk of that remaining percent.

And then what's left to do really long-term research, IT upgrades beyond what you just need to do to keep the lights on, really gets to be a very difficult decision that the Commission has to face every single year. About 70 percent of that budget goes to the Reactor Program and 30 percent to the Materials Program.

Budget trends, we, as I mentioned, went from 3,000 people to 4,000 people over the last five years or so. We are -- have been from 2009 to 2010 and then even going out into the future years, expect our budget to be flat. There will be essentially zero growth, maybe up to two percent growth. But it will be essentially flat.

And that will be the challenge to accomplish the new reactor licensing, the new fuel cycle licensing activities, and do the infrastructure upgrades within the current budget constraints.

MEMBER RAY: Bill, do you have any leverage at OMB and the fact that licensees pay a good portion of that?

MR. BORCHARDT: No. You know of that billion -- of a billion dollar budget, about 138 million actually comes from tax money. And the rest of it is derived from fees. But that concept, it just does not communicate with any lasting stay power to OMB.

MEMBER CORRADINI: Is that -- I guess you -- I was guessing 100 million. But so you said 138 then? I thought it was -- is it a fixed 90/10 split? Or is it something that you can, as Harold was saying, make the case and actually get more from the feds?

MR. BORCHARDT: I believe the Congress can adjust that. But it's -- I think the actual legislative language says approximately 90 percent.

MEMBER CORRADINI: Right.

MR. BORCHARDT: So that's what it has come out to be.

VICE CHAIRMAN ARMIJO: Bill, a couple of years ago, we were all seeing anticipated this huge bow wave of work. And in the interim there's been, you know, escalation in the cost of nuclear plants and cancellations, some deferrals. What is your forecast now? About the same, after all these puts and takes, things?

MR. BORCHARDT: Yes, Bruce will probably get into this a little bit. We've seen some deferrals. I think there has always been about five plants that were really serious. And I think that number is still pretty good.

I was at Vogtle last week. And they've spent a billion dollars roughly already on the project. So they are committed, right? You don't spend a billion dollars as a company at a half-hearted effort.

And they have more money being invested for the long-term procurement types of issues. So -- and there's a number of other projects that are very serious. The rest, I think, you know, maybe they are waiting to see how the first five go.

VICE CHAIRMAN ARMIJO: Thank you.

MR. BORCHARDT: Next slide please. I already mentioned the changing workforce a little bit. About 25 percent of the people that we bring on board are entry level, people right out of college. That's a very conscious management decision that we've made in order to try to flatten the age profile of the Agency.

We, ten years ago, were very age end of the profile loaded. And that's really flattened quite

a bit. Our average age now is down around 47 years old. It was up to 50 not too many years ago. So it's a reasonable age profile for us.

Three White Flint, we're really happy to have got that through GSA. We're going to be breaking ground in the next month or so. I forget the exact date.

But it is going to be right over by the White Flint metro station, just adjacent to the station there. And that will allow us to move all of the five offices where we have people scattered throughout the Rockville area back into the complex here. And that will make staying connected that much easier because it's a bit of a challenge.

We just signed a collective bargaining agreement within the last several months with the union. The most significant thing that did was allow us to expand the work hours flexibility for workers. So now rather than having a core hours and I can't remember exactly what the hours, but it's like 6:00 a.m. to 5:00 p.m. or 6:00 p.m., something like that, it's now expanded to earlier in the morning and later at night. It actually can go, with supervisor approval, out to 11:00 p.m. at night.

So we have the flexibility now in

considering people's balanced lives that if somebody has a childcare issue, they can come in to work early in the morning, leave for four hours in the middle of the day, pick up their child, do what they need to do, and then come back to work later at night. Or they can start at noon and work until night.

And we're monitoring that to make sure it actually improves our productivity. And I think it will.

MEMBER CORRADINI: How's the productivity measured for stuff like that?

MR. BORCHARDT: Well, just -- every office has an operating plan. We measure licensing actions in NRR for example. And so we would see the output essentially, yes.

MR. MALLETT: And you measure how much it takes, how much budget it takes for the same number of licensing actions. So you can get some comparison.

MEMBER CORRADINI: Do you find -- I guess I'm kind of curious about that -- do you find that the staff is, even though they're not physically -- take you example of in for something, out because of four hours, and then going to come back in, that in those four hours, they're still communicating, still contacting? I mean the impression I get from

telecommuting in other instances such as the university and laboratories is that you leave but you really don't leave. You're still in contact. Is that something you --

MR. BORCHARDT: Absolutely. You stay connected.

MEMBER CORRADINI: Do you encourage that? Or do you try to --

MR. BORCHARDT: My approach, my philosophy to the staff is we want people to have a balanced, reasonable lifestyle. And we want them -- when they're home to dedicate time to their kids or whatever their home life is. But that when they're here, to be here.

The one anecdotal story I'll mention about your staying connected in, you know, the federal government was shut down for a number of days because of the snowstorm. Essentially we didn't skip a beat. We had people working from home. I was stuck -- I'm not asking for any sympathy -- in New Orleans for that time.

(Laughter.)

MR. BORCHARDT: I mean it was awful. It was Super Bowl weekend, you know, Mardi Gras, so that was tough. But I was able to, you know, stay

connected. I had my laptop, I had my BlackBerry. We did our events brief at 8:00 every morning.

MEMBER CORRADINI: Ankle bracelet so you didn't get near the Superdome?

MR. BORCHARDT: So we actually did not skip a beat. We had -- a number of offices have to shut down for various reasons that week. And we had the responsibilities shifting between offices. It worked out really very well.

Next slide. My last slide, International Activities, is actually a growth area. It is increasing intensity. Bilateral activities, our relationship with individual countries continues to grow and stays intense.

Next week with the Reg Info Conference is a big week. I forget -- 17 different counties, I think, are coming. For some reason that number sticks in my head. I'm not exactly sure that's right. And we have probably meetings with each of them separately even outside of the RIC in various forms.

Multinational Design Evaluation Program, you've probably had some discussion or a briefing on. This is a cooperation between various countries having review activities for some of the new reactor designs. So we share our review information.

And then in October of this year, we're going to have an International Regulatory Review Service Mission, which is an IAEA mission come to the United States to do what is, in essence, an inspection of the NRC. And it's going to focus on the reactor program. This is a big deal for us. It is a big deal for the rest of the world to come here and do that activity.

MEMBER BLEY: Do you know if anything like that ever happened in the past?

MR. BORCHARDT: Not in the U.S.

MEMBER BLEY: I never heard of that, yes.

MR. BORCHARDT: We've participated in a number of missions --

MEMBER BLEY: Right.

MR. BORCHARDT: -- around the world. But this is the first time that we're hosting a mission.

MEMBER APOSTOLAKIS: And what is it that prompted this?

MR. BORCHARDT: It was just a commitment to show that we are a full partner in the process of improving nuclear safety worldwide.

MEMBER CORRADINI: So allowed to be reviewed as well as review.

MR. BORCHARDT: Right. Okay, next slide

please. Bruce, hit it.

MR. MALLETT: It's a pleasure to be here to share some insights with you in all of our programs. There is not a topic bullet that I've put on any of the slides that we couldn't spend four or five hours discussing. I know this group.

So what I'm going try to do is to give you a high level what we think are some of the issues and the path forward in each of these areas. And I'll go fairly quickly in the interest of time. But please feel free to chime in and stop and ask questions.

I selected topics that I thought would be of interest to you. There are many topics in this as well as the other areas that we do business in. And I would echo what Bill said. We have a fantastic staff, very well qualified, and we're recruiting well-qualified people into the Agency. And that makes my job very easy.

The first topic is power uprates. A couple of things I wanted to say here was that we have issued 129 power uprates over the past several years, all the way from the instrument uncertainty power uprates up through what we call the extended power uprates.

And we've appreciated the ACRS's input. I

think you've helped us get in the right place on many of those. We've added something around 5.7 megawatts electric to the grid because of that, essentially the equivalent to five nuclear plant units in today's world.

We have not been without some problems in power uprates. And I think we have to work with those. You all have talked about containment accident pressure. I think it is a margins issue. And we have to deal with that. And I think we're seeing some effects of some of extended power uprates on the boiling water reactors on the steam dryers and other areas. So we are continuing to monitor in that area.

Non-power reactors, what I wanted to mention here is we have non-power reactor licensees that -- out of the 32 licensees, 19 of them are in for renewal, some almost ten years old since we received the application. So we have a huge backlog.

What we decided about a year, year and a half ago, was that was unacceptable. And we needed to do something different about it. And in the past what we've done is thrown resources at it. What we decided this time was to do that but also change how we're doing business.

And so we're embarking upon a streamlined

approach to license renewals for research reactors or non-power reactors. And that's paying off in many ways with us. And we're actually in the middle of determining what is the minimum you need for a research reactor.

And what we're actually finding is some of the documentation in the file in the safety evaluation report is not very clear. So one of the things we want to do is clear that all up during these renewals. And I think we're calling this a streamlined renewal process and I'm very pleased with the initiatives in that area.

MEMBER CORRADINI: Can I ask a question about that? If your not going to --

MR. MALLETT: Sure.

MEMBER CORRADINI: -- I'm kind of curious about -- I asked earlier today in another session and I was told it was non-power reactors. The need for medical isotopes and this particular initiative relative to the Markey bill and potentially some unusual reactors to do this, will that rise to a very high priority if necessary because of the lack of medical isotopes?

MR. MALLETT: Yes, what we've done on the last bullet there, I mention that, is that as Mike is

saying, there has been a need because of a couple of the main suppliers of molybdenum-99 from the research reactor world, have had significant problems with their facilities and not having run time. So that created a shortage for the diagnostic world in the medical arena.

And so what the Chairman asked us to do, and Bill, and we did that is make sure we are ready to do reviews of applications as they come in the door. Don't promote them but make sure we're ready to do that.

We have in the budget resources to do some of that work. It depends on how many come in. We anticipate -- there has been interest from about eight different entities with us. We've met with them to discuss that interest and what they might need to come in for a reactor.

Now there are really two that I think are far along in this process and maybe a third. One is the MIPS facility with B&W. It's actually a --

MEMBER CORRADINI: Right.

MR. MALLETT: -- uranium solution-type reactor. And the other is the MURR facility looking at low enriched targets for making molybdenum-99. There is a third and it is an accelerator facility

that has come in and talked to us about using low enriched targets with an accelerator combination.

So the interest is there not only in this country but in others to try and get there first to get a part of this market. DOE has money they are putting in, seed money for people to develop this.

MEMBER CORRADINI: But you answered my question.

MR. MALLETT: I probably gave you too much, Mike.

MEMBER CORRADINI: No, it was just curiosity. I wanted to understand how it fit. Thank you.

MR. MALLETT: Okay. But that doesn't have to do with any of the streamlining. We're just set for the license.

And I would say if it is no unique technology, we can do it. If they come in with something different and unique in that technology, then it's going to take a while to develop the framework.

MEMBER POWERS: Doesn't the -- isn't there a problem with the value of the market being incapable of sustaining the cost of decontamination and decommissioning of a reactor?

MR. MALLETT: Well, there might be Dana. And that's an issue that has to be factored in certainly when you go it. It is a risk from a business standpoint.

One of the questions we answered with B&W was along those lines of well what kind of waste streams do you have in a facility like this if it a solution-type reactor --

MEMBER POWERS: Right.

MR. MALLETT: -- so to speak. And that would circumvent -- well, not circumvent but that would alleviate some of those if they don't have that waste stream. But you would still have decommissioning costs.

MEMBER POWERS: I would just -- I mean my examinations to some of these markets suggest to me that it is just very difficult to have enough to cover the cost of decontamination and decommissioning for a venture that might only be viable for a short period of time.

MR. MALLETT: And what some people are doing as well, and I'm not an expert at all, just what I've heard them say, is they are trying to split the facility. For example, they might produce the molybdenum-99 and ship it somewhere to be processed,

get FDA approval as a radiopharmaceutical company. And that way it would defray some of those costs.

License renewal beyond 60 years, we used to call this aging but I'm very sensitive to that now so we call it license renewal beyond 60 years. The issue here is we have some operating reactors now that have started into their beyond 40 year cycle. And there are others that are coming up in the next few years that we have given license renewals to.

So it's not too early to start thinking about what are the issues we are going to have to address if we do have the interest in operating existing plants beyond 60 years.

So our Office of Research is working with Department of Energy and EPRI internationally to try and come up what are the areas of questions we have to answer such as the radiation of cables, maybe the vessel itself, things that I'm sure you all are deeply involved in and we will have to have you involved in.

So I think it's not too early and we've put money in the budget to start the research in Marty's Office of Research under Brian Sheron.

MEMBER POWERS: But I guess the real question that comes down on that is where is the dividing line between the research that the Agency

should be doing and the research that the potential Applicant is going to do? How do you draw that line?

As in the example, the NRC paid for all of the heavy section steel research for decades. And who benefitted from that? Well, the primary benefit I'll say accrued to the licensees. But I mean there's a dividing line in there someplace and I don't know how you draw that.

MR. BORCHARDT: It's really difficult to draw it. Of course, we're really doing confirmatory research. And the licensee --

MEMBER POWERS: But the primary research hasn't been done.

MR. BORCHARDT: Right. Yes and that's the dilemma. And what happens, you know, you'll see with some of the advanced reactors, not the light water reactors, is that there is a need for a great deal of research and infrastructure development, standard review plans, et cetera.

But we don't know which designs are real. And you can't do it all. And so that's part of the dilemma why we need to coordinate with EPRI for example on the beyond 60.

MEMBER POWERS: You are going to see, I think, people coming in with fairly elaborate computer

codes.

MR. BORCHARDT: Yes.

MEMBER POWERS: And the next question is at what point do you say this issue is so important that I really do demand experimental validation? I don't live on your multi-colored computer outputs and things like that. I mean it's a question that I never get a very clear answer on.

MR. MALLETT: I believe you are ahead of us right now. We're still in what are the questions we should have answered. And not to who should answer them.

(Laughter.)

MR. MALLETT: It's a very good point.

MEMBER CORRADINI: But I guess to follow Dana's point because I think he's hit upon something that is that if you go down to the DOE side with all the change in administration, when I ask Shane Johnson this, I get an answer that says well, it's not our responsibility. It's the licensee's responsibility.

NRC provides some of the primary stuff. But I do -- I just wonder if there is a conversation, although informal, between that because I sense that it is not a clear boundary. But at least it ought to be a decision.

At least in NGNP, you are about to use a non-light water reactor. So you guys actually have a conversation. And I sense a chart is being developed that this is DOE's responsibility. This is ours and so on.

But in the beyond 60, I sense that the industry still is -- it is kind of mushy so to speak.

MR. VIRGILIO: From a research perspective, Mike, we're just beginning the dialogue.

MEMBER CORRADINI: Okay.

MR. VIRGILIO: But I think you get a different answer if you ask Pete Miller and Pete Lyons than you got from Shane Johnson. And we've been in -- Bruce and I have both met with them.

MEMBER CORRADINI: Okay.

MR. VIRGILIO: And Brian Sheron is meeting with them. And it really will be, at least at first to define where are the areas of interest, a combination of work with us, the Department of Energy, and EPRI.

MEMBER CORRADINI: Okay.

MR. MALLETT: And I think that we are in the process of making sure we don't duplicate efforts. That's another issue to keep in mind.

If I could go to slide seven, this one is

getting too controversial. We'll move on.

(Laughter.)

MR. MALLETT: If we look at the inspection program, all I want to mention about that is we have a very robust reactor oversight program. Many of you were involved in that process. It is still live and well today. The basic premises are still there.

But a couple of things that I would mention that are premises that we are looking at this year, one was it is a dynamic program. We are supposed to take current experience and operating experience and feed that back into the program and make sure we incorporate changes into the program.

We do that. There are operation experience program and I'll talk about that in one of the upcoming slides.

The other is I do believe a key to it are our people in maintaining the right skill sets for that program. And we've focused this last year on doing that as well as increasing the pool of people ready to be resident inspectors at the power reactor sites.

We were getting to where if there would be a vacancy, you had to go out and recruit for people to go there. Now we have this ready pool in each

regional office.

Buried piping, we put down there. The reason for that, as many of you know, has been around for years, that you've had buried piping, you've had issues with various mechanisms that cause leaks in that piping.

But it has come to light really since the 2005/2006 time frame when we had contaminated piping, mostly tritium, to where we put together an industry initiative and NRC initiative for groundwater contamination and what you do in response to that.

The along during the 2009 time frame, early in the April time frame, we can across license renewals where licensees were having significant problems showing up again with buried piping that was not only carrying radioactive materials but also safety related. And Oyster Creek is one of those facilities.

We decided we needed to look at this area to see if we needed to do something different. And so we've done that review and determined that many of the programs are still solid but some of the inspection procedures we have in place need to be revised so everybody is clear on what we do when you do have a facility with this problem. And factoring that in to

what kind of inspection should they do and how often.

We also are starting -- Bill is going to assign today a task force to go back and look at the 2006 recommendations in groundwater contamination to determine if they are still effective, do we need to do something more in view of the Vermont Yankee issues that people are raising.

It's really a public confidence issue though, in my view, versus a technical issue.

Yes, Mike?

MEMBER RYAN: I agree with you. I think it is a public confidence issue. But some of the other areas that they've touched with decommissioning, you know, Yankee Rowe, you know, had a lot of discovery of extra contaminated materials they didn't expect.

And I guess the question I have is these materials actually shift from being regulated under one part to the next part when they go from operating circumstances to decommissioning to offsite. And I wonder if there is a regulatory analysis that needs to be done to see how all this connects.

MR. MALLETT: Yes, that's part of this task force to look at this. But they actually connected this back in the 2006 time frame when a

previous task force looked at this.

And they put some proposed changes for Part 50 in the decommissioning rules for licensees to document when they have these incidents and document characterization of what radioactive materials were and what they did to try and correct it.

MEMBER RYAN: That's a great example because they documented spills but didn't have any requirement to clean them up at the time they occurred.

MR. MALLETT: Yes, exactly. And there's -- it's a little stronger in that area now. And this industry initiative we push them to do also takes cares of that I believe.

MEMBER RYAN: Well, okay.

MEMBER BONACA: One issue clearly is accessibility of components and maybe for the new plants, that's an issue because the problem is that this piping is buried. The cables are buried. And you begin to see leakage at 40 years of operation. And these plants are going to run for 60 years. So this is likely to be a major issue.

MR. MALLETT: It is. And thank you. That's an excellent point. Our Office of New Reactors under Mike Johnson are factoring these lessons into

their reviews for the new plants to see if we can't design them better and so that you don't have those unaccessible places.

Underground cables, all I wanted to mention there is we have had and we put out a generic letter in 2007, issues at nuclear power plants with underground cables that were environmentally qualified to be in a dry environment and some of the inspectors find that the manholes are flooded up to the top. So they are obviously not in a dry environment.

And so we have put together a generic letter to see the licensee's responses. And we're having inspectors go out and inspect for these and what licensees are doing to correct it.

The issue, to me, I believe industry needs to get more proactive in this area. And prevent water from getting into some of these areas and controlling the environment where the cables are.

Aging management, I think we covered that one a little bit when we talked about buried piping. But there are a lot of issues that we are now finding in the license renewal process. You have helped us with those like the Beaver Valley containment liner, things that have come up that we have now factored back into our program to say well we need to look at

those during our aging management reviews.

If I could have the slide eight, otherwise Darren and Marty won't have any time to talk. One other thing on operating reactors, we have issued a major security rule, as many of you know, on Part 73 this last year. And we are working through the implementation of that.

Licensees have to implement it by March -- end of March of this year. And what we found is that licensees have gotten on board with what they have to do but some of the physical changes that are needed in the plants are taking longer than they or we anticipated.

And so we're going through a process where we did not want to modify the rule if it is just having to do with the implementation date. So we are doing a case-by-case review as an exemption for each of these facilities. There are about 24 exemption requests for the sites in now. And we're working feverishly to get those issued before the end of March.

They all have to do with dates for implementation. And usually it is just a few months to get to another refueling outage or maybe a year in some cases to get parts.

VICE CHAIRMAN ARMIJO: Bruce, what kind of physical changes are you talking about?

MR. MALLETT: Well, what I can say in the public arena is if you remember in that rule, some parts of the rule were implementing things that were in the orders previously after 9/11/2001. Those changes were already made.

But there were some enhancements we felt would better security. Like some plants did not have their microwave zone inside a fenced area. It was actually outside the fence.

VICE CHAIRMAN ARMIJO: Okay.

MR. MALLETT: And now the new rule require that that has to be protected by another barrier outside of that one.

Some -- we're talking about backup power for some of the systems, the central alarm stations, and those areas, and they have to be -- run new cabling and things like that.

VICE CHAIRMAN ARMIJO: Okay. Thank you.

MR. MALLETT: The other thing about the security rule, the last bullet on this slide, cybersecurity plans, it required people to also factor into their plans defense, if you will, strategies against any cyber attacks on safety-related control

systems, digitally-controlled systems.

And so it requires them to go through various steps to identify what those systems are and what areas of protection that they will put in place. We received everybody's plan. It was due in November 23rd. We are in the process of reviewing those to determine whether there are any holes that we need to fix.

I think what we are going to come across is that for certain control systems, there is an isolation of those systems for many kinds of a cyber/internet system. And that gives us some gratification.

But some of the other systems that are maybe support systems, don't have that. And so licensees will have to implement controls for those.

The last item on this slide that I will mention is the emergency response data system. We have worked on upgrades to our system to actually have it faster, collect more data, do more things. And we've also -- those are done on our end.

We have now gone out to licensees and modified their end and are in the process of them having modify their communication system to go from the old analog modems to new digital systems in a --

Darren can help me here -- virtual -- what's it called -- virtual internet if you will.

But because of that, now they've raised the issue back to us well what about your own Part 73 rule. Now you've caused us to go from a dedicated line, physically isolated, to a system that could be connected to the internet.

And so we put some controls in place and worked with them. Glad they raised the issue to correct that.

If I could have Slide 9, I mentioned operating experience for new reactors. We do still do the trends analysis every year. And we look at certain indicators for operating plants. They are all getting better. We don't have any trends that are in a negative way.

Also the rate of excellent precursors that we look at in our sequence precursors are getting lower. So definitely improved performance out at the facilities in the nuclear power plant arena.

I would mention a couple of things here, though. One is the key to success of operating experience to me is that we take individual cases and feed them back into our program and share that. And we have a tremendous staff in our Office of Nuclear

Reactor Regulation that handles operating experience.

And I don't know if you've tried it on our web, it's fairly easy to get experience in the information on various events and share them. And it has been very helpful to us in looking for generic issues and actually training in early identification of issues.

There is this factor we've been trying the past couple of years. I hesitate to mention this to this group but the BRIIE, the baseline risk integrated --

MEMBER POWERS: You could get your hand slapped.

(Laughter.)

MR. MALLETT: -- incident or initiating events. A lot of indicators -- the school is still out to me as to what that is giving us. And so we're taking a look at it.

I'm not going to mention safety culture other than to mention that Marty Virgilio talked to this group about things we're doing in that arena I think last November.

MR. VIRGILIO: No, it was in January.

MR. MALLETT: In January of this year. And I really don't have much more to say on that other

than we do believe whether you call it safety culture, organizational culture, whether you call it open collaborative work environment, that it is very important to any organization's performance. And it has helped us to have early indicators of plant performance problems.

If I could go to the new reactor arena on Slide 10, we talked a little bit about this. Bill mentioned it. We have 17 applications now in house that we are actively reviewing for combined operating and licenses.

Of those, they are in various stages. Some have obviously been suspended for a while. Others are very active. I fully support Bill that we are going to have maybe five or six that are going to come to fruition early. And clearly the reference COL plants are going to occur early.

And it looks like per schedule, the Plant Vogtle site for the AP1000 will be one of the first out of the gate for us to make a decision and for you to obviously input to that as to whether it is ready to where we could issue that license.

We do have some challenges. One of them, I think, is to identify -- that we've learned through this first round, the design-centered approach, the

center of excellence approach to teams reviewing these has been very helpful, getting everyone together to look for issues.

But we have struggled with identifying things early so that they don't become a crisis in the schedule. And, for example, we found the tech spec issue putting in place for some of these applications where you don't have their new design, you don't have ready numbers to put into the tech specs was an issue we had to address. And that kind of thing you can't wait until the 11th hour to identify. You have to identify it early. So we're working -- I think that's a big challenge.

Another challenge is to maintain this expertise. Once these people have been through this process, we don't want to lose them or the parts or you won't gain efficiencies in the next set of reviews. They also will be very helpful during the construction inspection program.

But if you go to the design certification on Slide 11, there are several in the works. Probably the most notorious is the AP1000 shield building design. What I'm most proud of our Agency there is schedules are one thing but safety is another.

And the group identified some significant

issues with that design, addressed them to Westinghouse, and we're working through them. And I believe we will. But what I'm gratified is that the whole Agency, from the Chairman on down, supported the reviewers and the fact that they had issues they had raised that were legit, that they were real safety issues that had to be corrected in the design.

And Westinghouse, I think, has appreciated that in working through them.

CHAIRMAN ABDEL-KHALIK: Now we recently sent you an amendment regarding how ACRS can sort of optimize its review process with regard to amendments to DCDs. And sort of moving in the direction of issue-centered reviews versus chapter-by-chapter reviews.

Are you at a stage where you can comment on that?

MR. MALLETT: Yes, I don't think at this point. But we have that suggestion. And I think I could give you a personal comment but I'd rather give you the views of Mike Johnson and his staff. And we really haven't discussed it unless Bill has.

But that's a good question, Said, I'll get back to you.

MEMBER POWERS: One of the issues that

we've seen, especially concerning new reactors, I suspect offhand that we'll see it in the COL applications, maybe not in the reference designs but in subsequent ones, is incomplete, tentative applications coming in.

Are you trying to address that issue?

MR. MALLETT: For the COLs?

MEMBER POWERS: Yes. Well, COLs, design certifications, whatever it is.

MR. MALLETT: We have found incomplete ones. I think the acceptance application process has helped that at least from early on, looking -- and we have sent some back to say that you haven't addressed all of the areas.

As far as a quick and dirty review --

MEMBER POWERS: Yes.

MR. MALLETT: -- you can do that. As far as when you get into the details of the design, is it adequate to perform its function, that usually isn't discovered until you are actually doing the detailed review.

MEMBER POWERS: Yes, it takes the TBD things that show up.

MR. BORCHARDT: If I can, I guess I'm partially to blame because before this job, I had the

Office of New Reactors. And we very consciously decided to accept some incomplete applications because we had an office of several hundred people on hot standby and an untested process.

So we decided it would be better in the long view to start review of an incomplete application than to just reject it and have us sitting around. Let's learn something in the process. So we did that.

I fully expect that when we said that at that time that that would be the only time we would do that. And subsequent incomplete submittals would have to pass the appropriate threshold. So I would expect if we got some that were clearly deficient, we would return them.

MR. MALLETT: The other thing we are doing is we're meeting now with applicants and with industry and vendors as groups and we're feeding that back to them. Hey, these were incomplete in these areas. Make sure when you send yours in that you complete that area. And I think that helps the process.

The other challenge obviously is this process was designed to have the design certifications complete before the COL application reviews. That's not occurring or occurring at the same time. And so we're running tight windows now between when the

design certification would be done and if approved and when the COL review needs that because it has referenced it.

So far we're okay. We've been able to extend the schedules out. And don't have a problem. But if you keep having some holes in the design, you run a close time frame between that and when the applicants were wanting to start construction in their new facility.

If I could go to Slide 12, the only thing I'll mention here, new reactors, we are working very hard and heavily in the vendor inspection program. We have now in the budget to do about 15 of these a year. We're sharing information internationally. We're also in a construction inspection program.

As Bill mentioned, Region II is our center of excellence in that arena. They're sharing information internationally and sharing inspectors to go over. I think we've helped several sites in foreign countries identify issues. And we're getting information from them that have helped us in this arena. So I think that's all positive.

We have a strong program laid out for the construction inspection program. Don't have all the answers but we're working through them. And we are

about ready to start a resident inspector construction program at the Plant Vogtle site. We've posted for that position and we'll be selecting.

Probably there are many issues left unanswered. I know this Committee has raised several of them to us. ITAAC and that issue and how you maintain ITAAC once it is established, and, of course, the DAC and how you certify DAC and make sure it is a complete design review, we understand your issues there and are working through those.

I did want to mention operator licensing in simulators. We don't want to forget this area. We are embarking in the Agency on creating our own simulators for an ABWR and an AP1000 to start on platforms that can be shared -- on a digital platform that can be shared, we hope. And then all you would do is change models, depending on the vendor, and, of course, you would have to change the human factors control room design for each of the vendors.

And that's our goal. We have a back up. If we don't get that done, we have the vendors, those two areas have committed to us they will let us put our operator examiners through their simulator. I've been to the two and they don't have the -- of course, ABWR is operating. But AP1000 is not done yet.

And so we have also agreed to share lessons learned, which is an amazing feat to me between Westinghouse and NRC. And between Mitsubishi and a different vendor and NRC in formulating and building a simulator.

It behooves us all to have ones that work, that actually model the plant, and that are consistent between the vendors and NRC.

MEMBER-AT-LARGE STETKAR: Bruce, do you have anything in the pipeline for the EPR?

MR. MALLETT: We don't as of yet.

MEMBER-AT-LARGE STETKAR: Okay.

MR. MALLETT: But we will have to think that. We're hoping these general generic platforms at the training center will support an EPR as well. But we haven't gone down that route yet.

The next slide on advanced reactors, I believe you were briefed by NRO this morning. So I don't have to say much.

A couple of things though. There are two arenas we're focusing on, the NGNP, the next generation nuclear plants, working with DOE on what that design is going to be. We have in the budget to review a design and review an application for a prototype facility in that design.

We also have in the budget to review one design for a small modular reactor for some use in the country. And depending on whether that's a light water reactor or whether it is a liquid metal or a high-temperature gas, we have the framework ready if it is a light water. If it is not, then we probably have to develop the framework for that reactor.

And we have -- I'd probably say the one that is the farthest along on a small modular reactor is the mPower reactor by B&W. They seem to have the most backing right now, support carrying that through.

And I think with that, I'll turn it over to Marty Virgilio.

MR. VIRGILIO: Thank you, Bruce. And good afternoon.

What I -- just like Bruce, I have to start off by saying it is really hard to pick a few things to talk to you about given the time constraints. So I picked a few things that I thought would be interesting to you.

What I tried to do, the method for the selection was is to look out maybe over the horizon a little bit, not so much to talk about what we're working on today but what I think we will be working on tomorrow. And maybe for the next two years.

And each one of these areas I think presents a challenge to the Agency. And so let me start with this slide. And it is the fuel cycle facilities.

While we have a number of fuel cycle facilities under review today, these first two, the AREVA facility and the GE-Hitachi facility are ones where we are beginning the review. And the review will continue out until about 2012 when we make our final decision.

AREVA is basically the Urenco technology. This facility, also known as the Eagle Rock facility, is located out in Idaho. And I don't see that there are significant technical challenges there but, you know, we're just beginning our review.

The GE-Hitachi is extremely interesting because it is the laser isotope separation process. And so we have little or no experience in this area. We have the test loop now. This is a facility that is going to be constructed in Wilmington, North Carolina. And it is based on a technology that was developed in Australia. And it presents it own very unique challenges.

I would say for all the fuel cycle facilities, one of the challenges that we are still

working on is information security. I mean when you think about criticality, and you think about chemical safety and fire protection and some of the traditional issues, this puts a whole new overlay on top of what we are doing, including things all the way out to counterintelligence program, which are very new to this agency. So that's all I really wanted to say about those two facilities.

International Isotopes was sort of a New Year's Eve gift to us. They brought us the application at the end of the year. And this is a facility that will convert depleted uranium into more stable forms. It will actually -- what they are after is the fluorine. And they will use that for building and developing microchips.

But the real benefit, I think, to the nation is the disposal of about 25 percent of the depleted uranium that is going to be generated by all these new fuel cycle facilities that can be processed at this facility once it is constructed and if we approve the license. This will be located down in Southeast New Mexico, not far from the LES facility.

The next slide in terms of the operating fuel cycle facilities, I see our challenges in a number of areas. One is what we call this integrated

safety analysis framework, which is based on the integrated safety analysis that are conducted in accordance with Part 70 for each of these facilities.

And I know we've had some interaction with you all just recently. And we received the letter at the end of February with your recommendations about how we could advance the standard review plan and how we could use the ISAs or maybe build on the ISAs in a way that maybe more akin to the way we've done the reactor program in terms of risk informing.

You know we are going to use this information and I think it has got some advantages. I recognize the drawbacks of starting out with a process that is more based on engineering judgment and elicitation of expert opinion than maybe some harder data and numbers that we've used in the reactor programs but I still see some advantages. We've just got to use this tool appropriately and not outside the bounds, I think, of where you can push it.

The Revised Fuel Cycle Oversight Program is another challenge area for us. We've been working on -- we've had a program -- I would say we've had a program for a number of years for assessing the performance of the fuel cycle facilities.

It was called the Licensing Performance

Review Program. And it was developed maybe a decade ago, maybe a little bit more. And it has evolved over time.

But I think what we're ready to do or what we want to do is take it to the next level to make it look a little bit more like the reactor oversight process, to make it a little bit more predictable, scrutable, and to make it clear as to when a licensee crosses that boundary as like we do at the reactor program where we move from columns to columns to columns, that we know exactly what the actions are going to be as far as the NRC is concerned and as far as the licensee is concerned. So that's the operating fuel cycle facilities.

The next slide, on 16, this, Bill alluded to this in his opening remarks about spent fuel management, and so where do we go? How do we adjust NRC's programs in light of this new Administration and their views on Yucca Mountain?

So we're trying to be nimble and trying to think through the various elements of our new program. And they appear on this slide and the next slide.

Extended spent fuel storage, as Bill said, our technical knowledge, I think we can extrapolate and get out to maybe 120 years of dry fuel storage.

That is going to require some maintenance and it is going to require probably some additional inspection activities beyond what we do today.

But you look out beyond 120 years, and I think we are really stretching. And so where I think we are going to have to go here is develop the tools in order to advance our technical understanding around material degradation, what happens to the fuel, can you still move the fuel without criticality concerns at some point in time, maybe 100, maybe 200, maybe 300 years down the road. I mean that's the kind of thing that we've got to think about because I just don't see the Administration backing down.

And I just don't see Yucca Mountain coming back again. The motion is to withdraw with prejudice which means they can't resubmit that license application. So we're almost starting over again.

MEMBER CORRADINI: But technically you used 120. What is the determinant that came up with that number?

MR. VIRGILIO: It's just where we -- it's an extrapolation of the test data that we have --

MEMBER CORRADINI: Oh.

MR. VIRGILIO: -- from where we are today.

MEMBER CORRADINI: Okay. And then from

just a licensing standpoint, the current spent fuel dry cask storage, they are licensed in 25-year increments?

MR. VIRGILIO: Twenty-year increments. But there is a rulemaking now that is headed to the Commission that would take that out to 40. That would allow 20-year extensions.

MEMBER CORRADINI: Okay.

MR. VIRGILIO: So that's about where -- so almost -- 40 is almost a no-brainer at this point, if you'd pardon that expression. But now getting out to 60 and then getting out beyond 60, I think starts to become technically challenging.

MEMBER BANERJEE: What is the technical challenge there really to go beyond 120 let's say?

MR. VIRGILIO: I worry about the integrity of the fuel and criticality concerns if you try to move it. I mean I just -- there are other issues.

MEMBER BANERJEE: Do you think it will fall apart? Do you think basically it will fall apart?

MR. VIRGILIO: I don't know what it is going to do especially with the higher burnup fuel that we're using today. And the increased industry interest in going to higher and higher burnups. The

fragility, I mean to me that's a significant issue that we're going to have to deal with.

MEMBER BANERJEE: Okay.

MR. VIRGILIO: So that's one piece of that. The other piece of that is no matter what technology we go to, even if you go to reprocessing, you are still going to probably need some form of waste disposal.

Now everything we've done for the last several decades has been focused on the geology and the material out in the area of Yucca Mountain, the volcanic tuff.

So now we have to change gears and start thinking about what other media might use for long-term disposal of the fuel. And what are the technical challenges there. So that's a component of our longer-term program.

MEMBER POWERS: Are you paying attention to this DOE initiative in deep bore hole?

MR. VIRGILIO: Yes. And not only DOE but that's more of an international. I think we're picking up quite a bit of information through the IAEA and through some of our bilateral exchanges on what is happening in deep bore hole disposal.

The third area is reprocessing. And we're

trying to ensure that we're ready. We've had two letter of intent in terms of application that we could see in the 2012 time frame. Interestingly enough, we've got signals that DOE and this Administration is looking at maybe 20 years from now when we will be in a position to support reprocessing.

So there is a little bit of, I think, tension between the industries and maybe this Administration. But we'll see how that plays out.

CHAIRMAN ABDEL-KHALIK: Do we have the stream of manpower requirements in chemical nuclear engineering for, you know, a very active reprocessing program?

MR. VIRGILIO: From the gap analysis, we know where we've got the strengths and where we need additional technical support. And we are building the regulatory infrastructure in terms of the regulations and guidance.

So we may not have everybody on board yet. But I think we've got a very clear understanding of what we need in terms of the mix of skills.

MEMBER CORRADINI: So can I ask a different question? I guess I'm not -- so if you picked a point in time and worked backwards, that is let's just say that tomorrow it was near Whit in salt

or it was in Hanford in basalt and you work backwards from that, what is the timing you would need from a licensing standpoint and all the things you needed to have ready so that once they changed the geological medium, you actually are ready for it?

I mean when you said 120, I kind of looked. And then when you started saying other things, I thought -- but aren't we talking decades? We're not talking millenniums?

MR. VIRGILIO: I hope we're talking decades. I mean it's a political issue right now. It's not a technical issue.

MEMBER CORRADINI: That's why I want to just focus on the 20-years renewal.

MR. VIRGILIO: Yes.

MEMBER APOSTOLAKIS: So when you say 120 years, let me understand, you mean there may not be a permanent repository by then? That's what I'm asking you.

(Laughter.)

MR. VIRGILIO: You're about to walk into an SRM. You get to vote.

MEMBER CORRADINI: Did you say thank you?

MEMBER RYAN: But just to shift gears to reprocessing, could you talk a little bit about the

interagency regulatory matrix that would probably govern what reprocessing in addition to the NRC's role? Or how has that shaped up?

MR. VIRGILIO: I can't with authority -- I really -- there is going to be --

MEMBER RYAN: There's work to do there, is that fair enough?

MR. VIRGILIO: Yes, I think there is going to be a lot of work to do with DOE, possibly with NNSA.

MEMBER RYAN: And EPA?

MR. VIRGILIO: Yes, everybody will be players in this.

MEMBER RYAN: Yes. Thanks.

MEMBER POWERS: Could I just touch on a question on reprocessing? When you say you've got the manpower, I completely believe that for aqueous reprocessing because we've done that and we kind of know the length and the breadth of it.

When it comes to the pyro reprocessing, I don't think anybody has done that.

MR. VIRGILIO: I would agree with you.

MEMBER POWERS: And I don't think we have a clue what we need there. I mean I certainly draw a blank in the area.

MR. VIRGILIO: The two potential applicants, I don't think either are talking about pyro. So --

MEMBER POWERS: But the Department of Energy, that is one of their lead technologies. And they're fairly -- and it's like all new technologies. The effort has gone heavily into how to make it work and very little into how does it not work.

MR. VIRGILIO: Yes, I agree.

MEMBER POWERS: We've got time.

MR. VIRGILIO: Yes, fortunately.

On Slide 17, just a few more things to talk about, the research activities and I would assume that at some point, you will be working very closely with our research staff on some of what we are going to need to get out beyond 120 years in terms of research activities. But I would say that we've started interactions with EPRI, with DOE, and NEI.

And we've had two technical exchange meetings so far. And we've developed three -- we've developed a structure that includes three working groups. The first working group to kind of look at where we are today, what is the technology that we have in place, and where might the gaps be.

And the second group is to start thinking

about what are the modeling and experimental facilities and activities that we would need to close those gaps.

And the third group is looking at the actual demonstration projects, what sort of facilities might we need, what kind of demonstrations would we actually

have to conduct for these experiments.

CHAIRMAN ABDEL-KHALIK: A time frame of 120 years, given the uncertainties, may require a step-changing technology. How would you address that?

MR. VIRGILIO: This is going to be the function of these working groups.

MEMBER POWERS: It seems to me that I would count aboveground spent fuel storage as one of the real successes of the Agency. And it seems to be a technology that is extrapolatable fairly confidently.

VICE CHAIRMAN ARMIJO: I'm not so pessimistic about that. But I'd sure like to have early subcommittee reviews of plans in that area.

MR. VIRGILIO: And I would urge you to open the dialogue with our Office of Research --

VICE CHAIRMAN ARMIJO: Yes.

MR. VIRGILIO: -- because I think that now is the time if you want to get in early.

MEMBER CORRADINI: So I guess I want to ask that question since we are already thinking about reviewing what you are planning to do. Where does it -- I guess I don't know the answer to this but I'm curious, not that the current repository is officially off the table, does that mean that this committee looks at things on spent fuel stopped or centralized storage facilities, where does the ACRS stop being asked of its opinion? After spent fuel? Or after centralized storage facilities?

MR. VIRGILIO: I think that is an issue that you and the Commission have to discuss.

MEMBER CORRADINI: Because you already have PNS --

MR. VIRGILIO: Which we license.

MEMBER CORRADINI: -- and it's licensed.

MR. VIRGILIO: But that was, again, a political issue with the state and other agencies.

MEMBER CORRADINI: It is still in front of the courts to undo that knot.

MR. VIRGILIO: Right. But similarly with the high level waste, while there is a motion to withdraw, that motion has got to be adjudicated and

could even be appealed to the Commission.

So we're continuing -- as of today, we're continuing to work on our SER, we're continuing to conduct our review activities for high level waste. We haven't stopped. And we cannot stop until the Commission directs us to stop.

MR. HACKETT: Mike, I was just going to mention really quickly with the charter revision that came our way in 2009, it is clear that the ACRS has the responsibility to do things in the spent fuel storage area.

MEMBER CORRADINI: Even centralized facilities?

MR. HACKETT: Yes, correct.

MEMBER CORRADINI: Okay. I didn't know that. That what I was kind of curious about. Okay, thank you.

MR. VIRGILIO: And the last bullet on that slide is we're just looking at how we can enhance our licensing process in this area. As you know, that's a rulemaking process. And it is cumbersome and takes a fair amount of time.

The next slide, on 18, just to talk a little bit about radioactive sources, looking ahead -- well, let me look back for a second, in 2005, the

Energy Policy Act tasked the Chairman of the NRC with leading a task force on the safety and security of radioactive sources.

And we provided our first report to Congress in the 2006 time frame. And we owe our second report to Congress now in 2010. So we're currently working on that report.

And basically what will come over the next several years is the recommendations that come out of that report. And the staff implementation of those recommendations, in some cases looking to increase the security of radioactive sources.

One of the elements that I hope to take credit for in that report is Part 37. That's a new rulemaking that would include -- what it does is it codifies the orders that we put in place following 9/11 for the security of radioactive sources.

And then it also picks up on lessons learned that we've gained through the implementation of those orders. It picks up on the independent external review panel that Mike participated on, which provided additional recommendations to the staff.

So all of that is wrapped into Part 37. And right now, that rule is before the Commission. It is in a draft form. And we're asking the Commission

to let us put it out for public comment.

Another element of the program is a policy statement on cesium chloride. As you may know, cesium chloride is highly dispersable and mobile. And it is probably a radionuclide of choice if you wanted to cause mass disruption.

I don't think it is a radionuclide that you are going to have any serious injuries or impacts on public health and safety but it is a tool of, I think, it could be a tool of choice. For that reason, we've got very tight security on the cesium chloride, particularly in the blood irradiators which is where it is used around this country.

But we're still, with this policy statement, urging the development of alternative technologies. And ultimately I think that's where we would want to go. But we have to do that very carefully because there's medical applications.

Blood irradiators are extremely important and the doctors are not -- there are portions of the medical community that are not convinced that there are other viable alternatives at this point. And so the last thing we want to do is get in the middle of this and really cause --

MEMBER POWERS: You don't want to get into

the healthcare debate? I mean you're missing everything. This is where the fun is.

(Laughter.)

MR. VIRGILIO: So the policy statement is a gradual approach toward looking for alternative forms of cesium chloride. And if anything in the threat environment would change, well then our posture would change. But at least right now, we believe that it can be done very thoughtfully and over some period of time.

The next slide, just a little bit more, we're very proud of the National Source Tracking System that's gone into place. It's been in operation for a little over a year now. And it tracks the sources owned by over a thousand, roughly 1,300 different licensees, tracking on the order of 50,000 sources.

That is just a source tracking system. What we're headed for in the next few years is web-based licensing and the licensing verification system. So we have a web-based understanding of where any source is, who is the licensee, where is it moving to and from on almost a real time basis.

And that's the goal to be able to have that additional measure of security around the sources

by knowing at all times where they are. So that's a goal that we'll be striving to achieve over the next couple of years.

And then finally in this area, I want to mention that we're looking at revising our radiation standards. This is Part 20, Appendix I for the release of effluence.

We're looking at -- and it all starts with the International Commission on Radiological Protection. They came out with their recommendations in 2007. And we're studying those recommendations to determine if and how we should be modifying our recommendations.

This is going to be a multi-year project to develop the technical basis to move forward. And I'm sure there will be lots of opportunities to interact.

MEMBER SIEBER: I have a question on the source management. What are you doing, if anything, in the area of unlicensed sources that have come to attention from time to time in new articles, for example, exit signs in Wal-Mart had a --

MR. VIRGILIO: General license -- there are general license sources, yes. I think the biggest thing that you are referring to that we've faced over

the last year is the Wal-Mart issue --

MEMBER SIEBER: Right.

MR. VIRGILIO: -- where basically these are exit signs --

MEMBER SIEBER: Right.

MR. VIRGILIO: -- and they've basically lost control of the exit signs.

MEMBER SIEBER: Right.

MR. VIRGILIO: And we've gone out to all similar licensees and with requests for information. And we're developing a plan to follow up and close on that. Wal-Mart -- actually we went to enforcement on Wal-Mart. And it was a significant action.

MEMBER SIEBER: They actually did pretty good but I think that there is a ton of other folks out there and a lot of material. And it doesn't seem to me like there is a way for you to identify where all this stuff is and who has it and how they are dealing with it.

MR. VIRGILIO: Right. Now what we're going to have to do at some point is draw the line because even with Wal-Mart, while it does create a problem in terms of extensive cost for clean up --

MEMBER SIEBER: Yes.

MR. VIRGILIO: -- when you think about it

from a risk significant perspective, I think you can easily draw the line and say, you know, enough is enough. We need to do better going forward. But I'm not sure that we are going to go back out and capture all of the big box stores that may have lost control. And it's just we don't -- it's not worth it.

MEMBER SIEBER: Or even little box stores. On the other hand, who makes the decision as to where you draw the line below which you are not going to bother? Is that a rulemaking? Or does that take Congress? How do you get there?

MR. VIRGILIO: I think the staff is going to have to make a recommendation to the Commission as to, you know, this is good enough. I mean we'll continue to operate under the general license system. If we want to change that, yes, that would have to be a rulemaking.

MEMBER SIEBER: Okay.

MR. VIRGILIO: If we wanted to -- and, we are, in fact, as a matter of fact, there is rulemaking, not in this area, but to take some of the sources that are -- what IAEA has five different ranges for sources. And now we're looking at one-tenth of Category 3 to require everything from that point and above to be specifically licensed sources.

MEMBER SIEBER: Okay.

MR. VIRGILIO: So we really are reexamining what we have a tight control over and what we have lesser control over from a risk perspective. And we are changing our regulations.

MEMBER SIEBER: How long do you think -- you know changing a regulation is, at the very minimum, a two-year process. But how long do you think it will be before all of this is sort of under better control? Five years maybe?

MR. VIRGILIO: To implement the new rulemaking, it will probably be five years if you think about the agreement states as well.

MR. BORCHARDT: It's at least five years, I think.

MEMBER SIEBER: Yes, I was being -- well, it is an issue. I'm not sure how important it is but it makes the newspapers and that makes it important.

MR. VIRGILIO: It is a public perception issue more than a health and safety issue.

MEMBER SIEBER: Right.

MR. VIRGILIO: I agree.

MEMBER SIEBER: Thank you.

MR. VIRGILIO: The last slide I have in my set is on decommissioning and low level waste. And if

I look out over the next couple years, decommissioning continues on. I really don't see any significant challenges in the reactor arena.

In the materials arena, we still are tending to deal with licensees that don't have the funds necessary to complete the decommissioning activities. And that is going to be our challenge. Some of these sites wind up listed by EPA. Some of them find money though other sources.

Uranium recovery, that's the other end of the expansion from this nuclear renaissance. And we continue to receive additional applications for in situ leach and other types of uranium recovery facilities. And I don't know that that is technically challenging but we do have a lot of stakeholder interest.

There are -- I think there are a lot of bad memories around some of the legacy sites. And so as you see, the start up of some of these new uranium recovery sites, we often find that we are dealing with concerns that date back to some sites that are still not cleaned up, most of which are under DOE's control, under UMTRA and not necessarily our sites.

Under low level waste disposal, a number of challenges in that area. I think one that we are

going to be facing over the next year is depleted uranium and how is that disposed of. The Commission has asked us to develop a very narrow rulemaking to ensure that depleted uranium is disposed of safely.

The staff's view is this is Class A waste. But I want to be abundantly clear. We want to make sure that people are actually performing performance assessments for the disposal of depleted uranium. And so that is the focus of our rulemaking, to lay out what would be our expectations around a very focused performance assessment.

MEMBER RYAN: Marty, just so everybody knows, we've got a briefing on that this week. And we'll be writing a letter.

MR. VIRGILIO: Oh, good. Okay. Great.

The next area is blending of low level waste. I don't know if you've been briefed on that yet. But the staff has been tasked by the Commission to provide a paper. And we will be doing that sometime in April.

And that's a very controversial issue. And what we're basically looking at is blending like substances. And you could use resins from the reactors as an example of taking resins and blending maybe more radioactive to less radioactive. So you

are blending from Class B down to maybe Class A for disposal.

And I think that's got a lot of concern. And we've had a lot of stakeholder interest. We've had a couple of workshops.

The last issue is the larger revision to Part 61. I mentioned the DU is a very narrowly-focused revision. The Commission has also asked us to go out and look at should we be re-looking at our entire low level waste disposal schemes and how that's done.

And I think Mike Ryan and the ACNW, some of the best work that I think we will be able to leverage come out of reports that were developed by the ACNW on low level waste disposal. And I look forward to moving out from the points that you all took us to to maybe where we need to be to deal with the decades to come.

That's all I had in my presentation. Thank you.

MEMBER RYAN: One final point on 61, that includes the waste classification system as a whole?

MR. VIRGILIO: Yes.

MEMBER RYAN: Yes, okay.

MR. VIRGILIO: The Commission has asked to

re-look at everything.

MR. ASH: Okay. Thank you. This is the opportunity to address the ACRS. This is my first time.

MEMBER POWERS: I think we look upon this as fresh meat.

(Laughter.)

MR. ASH: I was told I had an hour and a half, is that right?

(Laughter.)

MEMBER POWERS: That should get you through Slide 1.

MR. ASH: Yes, actually what I've agreed to do is next time I come brief, I'll go first.

(Laughter.)

MR. ASH: In all seriousness, I know that -- I'm cognizant of the time we've got. And my interest was to go through my slides fairly quickly and really touch on those types of things that I thought would be of interest to the ACRS but also of note, Ed and his staff, but everybody here in terms of when you are visiting the NRC complex, the White Flint Complex, and when you are touching the NRC systems.

So with that on Slide 21, Bill had touched on really briefly Three White Flint North. We've

obviously signed the lease. We're in the midst of staffing the project team.

We're in the midst of standing up and actually we've stood up all of the planning teams, inclusive of NTEU, to define the requirements, really the more discreet detailed requirements for what will Three White Flint be. And the types of amenities, the types -- how it is going to be outfitted. That is now going on. And that will continue up to the point obviously that we are planning to occupy the building in 2012.

On a more immediate front, knowing that particularly One White Flint dates back to the late `80s and it shows its age, Bruce had talked about aging management, the building shows its age. We need to ensure that as the regions have improved their space, we've got our interim facilities that have nice space. This is nice space where we are right now.

We need to ensure that both One White Flint and Two White Flint are brought up to the 21st century. Everything from carpet to bathrooms to whatever as well as security, there will be things that will be happening that are currently going on right now as well as things that will be going on over the next year, even inclusive of a better perimeter

security that we knew that was imperative. We needed to improve.

We also know that once Three White Flint is stood up and people have occupied it, that is also our opportunity to start to renovate both One White Flint and Two White Flint, using Church Street as a swing space. So eventually -- and I can't tell you what year it would be -- there will be floors that will be unoccupied because we'll go for full-scale renovation.

We know One and ultimately Two have to be renovated. Everybody has to be on equal footing in terms of the space.

MR. MALLETT: Before you go to the next slide --

MR. ASH: Yes?

MR. MALLETT: -- I've asked for one thing in the new building, no unique angles.

(Laughter.)

MR. ASH: I'm waiting for Bruce to ask for a room to be named after him.

PARTICIPANT: Could we get somebody to pave the road, the street between White Flint Station?

MR. ASH: Okay. I won't even talk about the discussions we've had about even getting honestly

people safely between One White Flint and Three White Flint. That is one of our top priorities from an agency, ensuring the safety of our workforce but also our visitors. Yes? Okay.

I think everybody here would agree that the public's confidence in us as a regulator depends on their ability frankly to understand what we're doing. To have access to information, to be able to participate and attend public meetings in particular.

And there are a variety of things that are underway, one of which, the first bullet which is open government, which was one of the President's agenda items, how can we, as a federal government, improve how we are more collaborative, participatory, and open of everything from data and so forth?

For us, General Counsel said we are one of the should agencies as opposed to a shall agency. But it was a natural. This is one of our values. Us being open, the NRC being open.

We've taken this, established a website. We're in the midst of finishing up an open government plan. The heart of it is what are the ways, putting forth before the American public, what are the ways that we can improve? What are the ways we can enhance how we share information but also allow the public to

understand what we do? And we're very excited about that.

Website redesign, not one of the best websites in the federal government. I underscore not. We're in the midst of updating that one.

MEMBER CORRADINI: Your search engine is pretty good actually.

MEMBER SIEBER: Yes, it's not bad.

MR. ASH: Yes, the search engine for ADAMS leaves a lot to be desired.

MEMBER SIEBER: Yes, it does.

MR. ASH: And that's one of the top complaints of what we do. Bill talked about ADAMS. In `99, it was state of the art, 2010, it needs to be replaced. It has to be replaced.

If I were to identify my top IT initiative, it is the replacement of ADAMS. I think many of you probably use it, try to use it, or try to find information. We know. It has a significant number of weaknesses.

One of my lessons learned pretty early on after I arrived at the NRC, it was down for a couple of days because of a technical issue, I heard about that. And that was my lesson in terms of how the public uses ADAMS to frankly understand what we do.

And when that's down, their confidence in us diminishes.

MEMBER POWERS: One thing you might want to at least thank or acknowledge some of the people, especially in NRR, on very high profile issues, GSIs and things like that, have been very good about keeping the website up to date with information on meetings and progress and things like that. They've done a really bang up job on that.

MR. ASH: The key thing for me for the website is making it extremely easy for anybody to find the information they need. That's what anybody should expect from these types of websites, particularly one from the NRC.

Multimedia, quickly, that's improving. And we've been doing that over the last year or so. How do we ensure for a stable, reliable means for the public and people to be able to see what we do? Be it webstreaming, audio conferences, and so forth.

We had some serious challenges about a year ago. We have made improvements. We still have a ways to go. But I'm happy with the progress we've made.

Next slide, Bill touched on about the fixed costs, that one really does effect IT. About 80

percent of our IT spend frankly is on operating and maintaining what we've got.

Now we need to find the balance of how do we introduce new technologies, keep the things that we've got going, going, and that's the fine line that we're having to deal with. And realizing that we've got a lot of applications and systems that are outdated. ADAMS was one but a lot of other legacy applications are outdated. We need to modernize that.

How do we deal with it from a funds perspective, particularly when we are basically in a relatively flat budget?

I'm going to flip to the next slide real quick. This is something that we introduced about a year ago. Sat in front of the Commission, talked about it. The Chairman, one of his top priorities is working from anywhere.

Pretty much everybody around the table works from anywhere. You do. How do we ensure that you, as the ACRS, employees, construction, inspection employees, how do they get access to the information they need wherever they might be?

I use the best example. If I'm at Vogtle, what broadband capability do I have? It may be very limited. Do I have the means to be able to do what I

need to do to do the work, communicate, find information?

We need to be able -- we've been testing that out. We've been very fortunate to be able to work with ASLBP, OIG, and with OIS to test out what types of equipment, what types of requirements are necessary to be able to support that type of ideal? Given the need for a mobile workforce, the reality of that, we have to be able to support that.

Next slide, real quickly. Other management improvements. An imperative from the Chairman, improving how we do contracting. Training techniques, Bruce had mentioned about the training simulators for the new reactors. That's one aspect to it. We have to go beyond what we've currently got: iLearn, electronic learning, to other types of innovative techniques.

MEMBER CORRADINI: iLearn is right up there with ADAMS.

(Laughter.)

MR. ASH: We do the surveys, we know. I think I shouldn't have used iLearn.

(Laughter.)

MR. ASH: Next slide. Yes, next slide is questions. We also have to ensure that we do IC

security correct. We protect the information, protect the network, protect the data.

Disaster recovery, we've briefed the Commission a variety of times to talk about how do we ensure that this Agency continues to operate in an event we have an issue. Bill talked about when we had the snow event. We continued to operate. And continue to mature that.

And measuring success, and I use these forms but also the surveys we do. A lot of frankly what is important to be, be it me visiting the regions, me visiting the ACRS, my staff is getting the feedback. We do it through the surveys, the in-person meetings. We have to get that feedback.

The only way for us to improve and frankly even know what we need to improve is to get that type of feedback. That's the way we either know that we are succeeding or we need to frankly do something different.

With that, I'll turn it over to Bill.

MR. BORCHARDT: Mr. Chairman and Committee members, thank you very much for the opportunity. We really do very much value your contribution to our mission as an Agency. I mean the independent review that you give and the thoughtful insights that you

provide to us are invaluable.

Even though you have noticed as one of my management philosophies, I have done a lot of work throughout the staff to get signature authority and those things to the right level to hold office directors accountable for their responsibilities.

Even though you may see some responses come back from office directors, they all get reviewed up in the EDO's office. And the expectation is that when there is any disagreement or contentious issue, that it gets a very detailed reviewed from one of my colleagues sitting up here with me.

CHAIRMAN ABDEL-KHALIK: Nevertheless, I think there was a recent example of that.

MR. BORCHARDT: Yes.

CHAIRMAN ABDEL-KHALIK: It is our preference that your responses come directly from you. Just as a matter of tracking over long term of sort of resolution of issues, we would like to be able to track, you know, responses to issues from a single source rather than trying to sort of find where responses to a specific issue came from in the past.

And we can talk about that offline.

MR. BORCHARDT: Okay. We'd be happy to talk to you about that.

CHAIRMAN ABDEL-KHALIK: As you may have noticed, we never wait for a slide that says questions.

(Laughter.)

CHAIRMAN ABDEL-KHALIK: We really appreciate your taking the time to come and brief us and we also very much appreciate your punctuality, starting on time and finishing on time. Thank you very much.

MR. BORCHARDT: Our pleasure. Thank you. Have a good afternoon.

CHAIRMAN ABDEL-KHALIK: Off the record. We'll take a break.

(Whereupon, the above-entitled open meeting of the Advisory Committee on Reactor Safeguards was concluded at 3:02 p.m.)

United States Nuclear Regulatory Commission

Protecting People and the Environment

Presentation to the ACRS

Digital I&C Design Acceptance Criteria

Methodology and Approach to Inspection and Resolution

March 5, 2010

Objectives

Provide the Committee:

- **Details of proposed Digital I&C (DI&C) Design Acceptance Criteria (DAC) inspection methodology**
- **Overview of staff approach and plan for conducting pilot DAC inspection for South Texas Project 3&4 (ABWR Design)**
- **Summary of long-term goals for integrating pilot lessons learned and DAC inspection process enhancements with ITAAC Closure process**

Background

- **Staff initiated complex ITAAC/DAC inspection framework development in mid-2009**
- **South Texas Project (STP) requested staff verification/audit of early DI&C DAC elements in 6/09 letter**
- **Staff commenced development of DAC inspection methodology that would be "piloted" with STP**

Pilot DAC Inspection Benefit

- **Staff gains confidence in STP processes at early stages of design & implementation effort**
- **Informs NRC DAC inspection process**
- **Enables optimization of process and resources for future DI&C DAC inspection**

DAC Working Group Overview

- **Chartered 11/09 to develop and implement DAC inspection methodology in test case (pilot) with STP**
- **Collaborative effort between NRO divisions, RII/CCI, OGC and NRR**
- **Primary focus is DI&C DAC (piping and HFE DAC efforts also initiated)**
- **Charter later modified to include integration with ITAAC Closure process**

Working Group Activities

- **Development and refinement of DAC inspection process (framework) that coordinates staff expertise**

- **Development of inspection strategies and procedures**

DI&C DAC Inspection Considerations

- **Scope and depth of inspection**
- **Not a licensing review**
- **Focus on the licensee's process and the Acceptance Criteria**

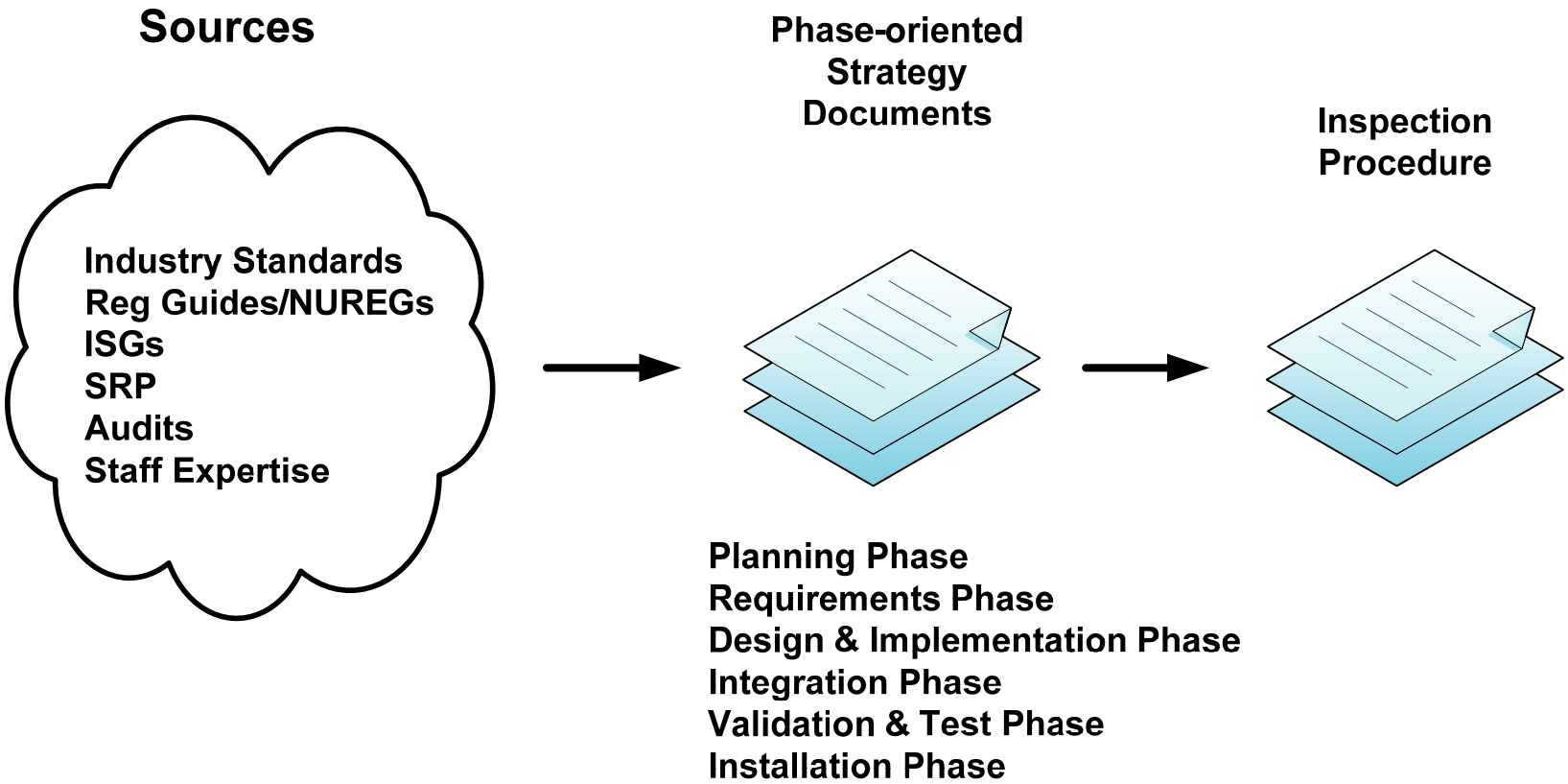
DAC Inspection Objective

<u>Verification</u> that the design detail will meet the acceptance criteria (complies with licensing basis)

DI&C DAC Inspection Strategies

- **Planning tool for DI&C inspection activity**
- **Technical information and insight for the inspector**
- **Generic for any DI&C DAC inspection**

Inspection Tool Development



Strategy Documents

- **Input from industry standards, guidance, staff expertise, etc.**
- **DI&C system/software lifecycle phase-oriented**
- **Feature key attributes, acceptance criteria, inspection techniques**
- **Precursor to the DAC inspection procedure**

DI&C Lifecycle Phase-oriented Inspection

- **Focus:**
  - **process and technical activities within each lifecycle phase**
  - **transition activities between phases**
- **Phase inspection typically starts when activities for a given phase are complete**

Lifecycle Phase Inspection

- **Assessment of design processes and documentation**
- **Sampling of attributes within the phase**
- **Thread audits (where appropriate);**

  [**Requirements-Design-Code-Testing**]
- **Assessment of Software QA processes and activities**
- **Assessment of Independent V&V activities**

Inspection Level of Effort

- **Front-loaded effort for the Planning and Requirements phases**
- **Effort is scalable based on early findings**
- **Inspection will be conducted for each safety-related DI&C platform and software application**

South Texas Pilot

- **Schedule driven by availability of STP DAC products**
- **Originally, pilot inspection planned for 2nd Qtr 2010**
- **Based on STP schedule, a two-part pilot inspection is more appropriate**

Two-Part Pilot Inspection

- **Part 1: <u>Program</u> inspection of high-level DI&C lifecycle planning and process (June 2010)**

- **Part 2: <u>Implementation</u> inspection of selected DI&C platform planning phase activities (Nov 2010 (tentative))**

Planned Pilot Activities

- **Complete Inspection Strategies**
- **Develop new DAC inspection procedure**
- **Select DAC product for inspection**
- **Tabletop process with STP**
- **Identify inspection staff**
- **Conduct the Pilot Inspection**

Pilot Inspection

- **Governed by IMCs 2503 (ITAAC Inspection) and 0613 (Inspection Documentation)**
- **Inspection issues will be screened and documented in a docketed Inspection Report**
- **Inspection Report will be used as applicable to support closure verification for related ITAAC**

Post-Pilot

- **Compile and incorporate lessons learned**
- **Modify, refine and enhance process as necessary for generic industry applicability**
- **Integrate with ITAAC Closure process**

Long-Term DAC Inspection

- **STP provided a schedule for DAC availability through factory testing**
- **Staff working on identifying DAC inventory among all designs**
- **Staff will plan accordingly to accommodate DAC inspection**

Future Activities

- **Post-Pilot, work with NEI to modify NEI 08-01**
- **Reg Guide 1.215 will be updated accordingly**

Discussion/Committee Questions

Advanced Reactor Program

ACRS Meeting

March 5, 2010

Advanced Reactor Organization

Michael E. Mayfield, Director

Advanced Reactor Program

Office of New Reactors

Background

- Pre-application interactions with potential domestic suppliers increasing
- Energy Policy Act of 2005 established Next Generation Nuclear Plant Project
- Significant global interest

Background

- Established the Advanced Reactor Program
- One of three subprograms in NRO
- Lead licensing project management organization for all advanced reactors

Background

- Advanced Reactor Program
  - Priorities to:
    - Building organization (staffing, resources)
    - Developing regulatory infrastructure and addressing generic policy issues for SMRs
    - Preparations for Next Generation Nuclear Plant (NGNP)
    - Preparations for other near-term SMR applications (e.g., integral PWR designs)

Background

- Office of Nuclear Regulatory Research
  - Current RES focus is related to high temperature gas-cooled reactor technology (NGNP)
    - Coordination of research activities with DOE
    - Development of analytical models and tools
    - Materials and high temperature environments
  - Currently developing research plans for integral PWRs and for sodium-cooled fast reactors

Advanced Reactor Program

- Program addresses four technology groups
  - High Temperature Gas-Cooled Reactors (i.e., Next Generation Nuclear Plant (NGNP)
  - Integral pressurized water reactors
  - Sodium-cooled fast reactors
  - Other Designs

Next Generation Nuclear Plant (NGNP)

William Reckley, Branch Chief

Advanced Reactors Branch 1

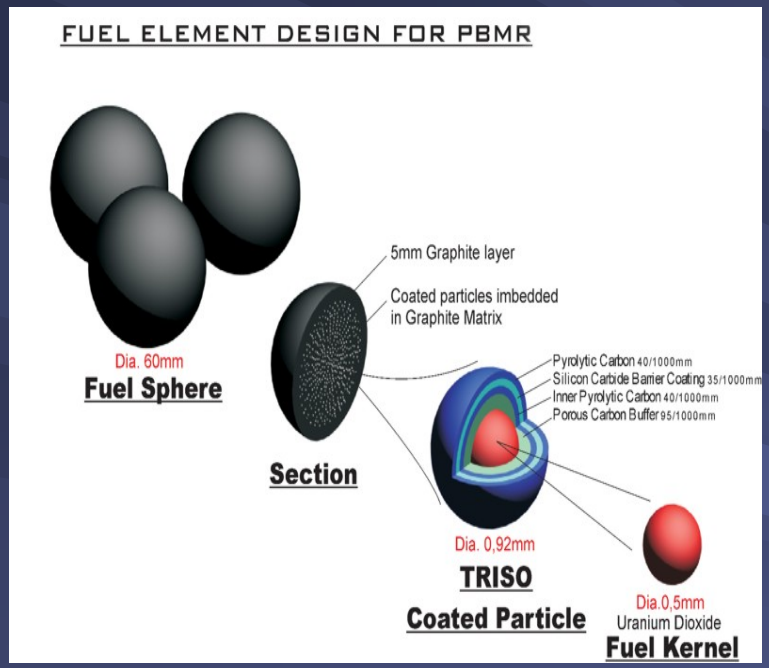
Advanced Reactor Program

Office of New Reactors

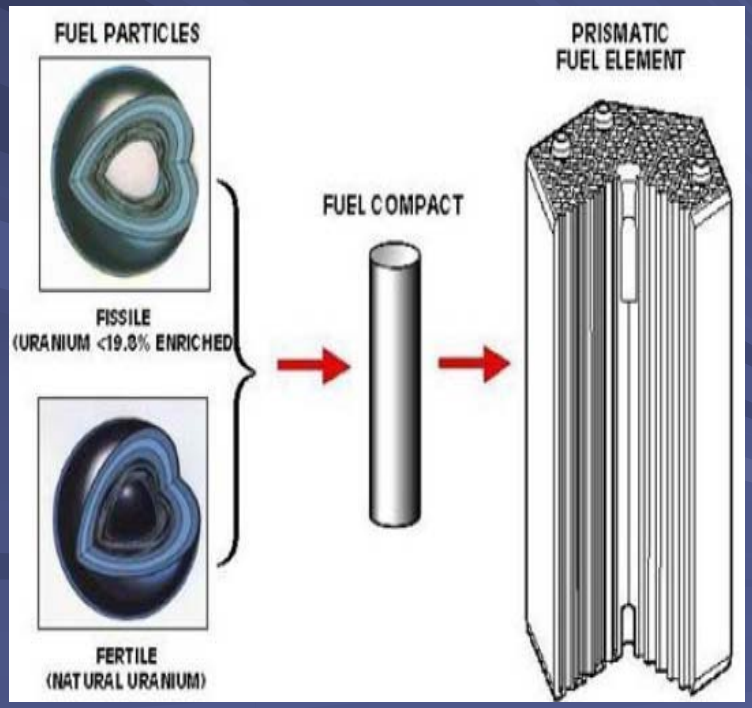
NGNP-Overview

- Energy Policy Act of 2005
  - The NRC shall have licensing and regulatory authority....
  - The DOE and NRC shall jointly submit ...a licensing strategy for the prototype nuclear reactor...
    - August 2008 report states success depends on:
      - Productive use of pre-application period (now to 2013)
      - Meeting major milestones, including supporting research and code development
      - Developing supporting regulatory infrastructure
  - No later than September 2021, complete construction and begin operation...

NGNP - Technology



Prismatic
(e.g., Areva Antares & General Atomics Modular Helium Reactor (MHR)



Pebble
(e.g., Pebble Bed Modular Reactor (PBMR)

NGNP Reactor Designs

Fuel: Triso Fuel Particles

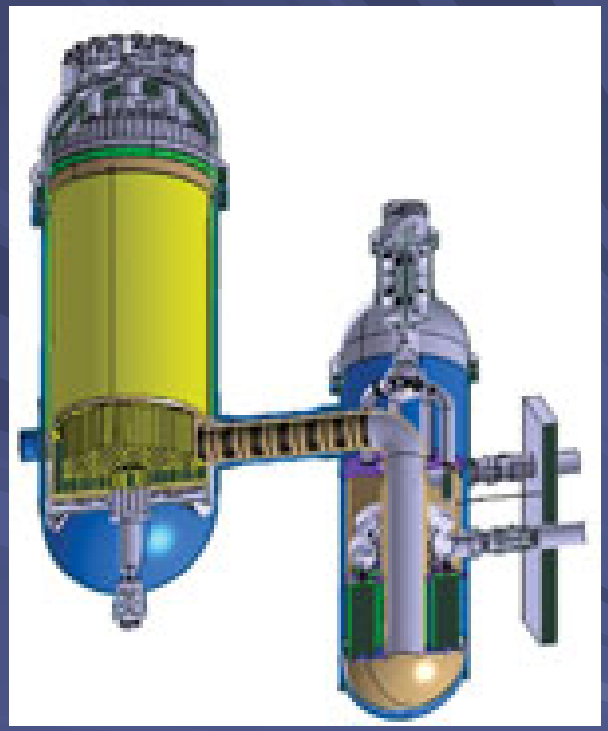
Power Level: ~ 250 MWt

Outlet Conditions: ~ 750°C

Coolant: Helium

Power Cycle: Steam Turbine

Phase 1 – conceptual designs (Aug 2010)
Phase 2 - decision point – early 2011



NGNP – Current Activities

- Evaluating existing requirements and guidance to identify needed changes (gaps)
- Identifying significant policy and key technical issues
- Developing overall licensing plan that coordinates:
  - DOE/vendor research and development
  - NRC confirmatory research & development of evaluation tools
  - Required changes to regulations, policies and guidance
  - Development of infrastructure and technical expertise for new technology

Near Term Reviews

- NGNP White Papers
  - Defense-in-depth
  - Fuel design and qualification
  - Mechanistic source term
  - High temperature materials
  - Licensing basis event selection
  - Safety classification of systems, structures, and components
  - Analytical code verification and validation

Integral Pressurized Water Reactors

Stewart Magruder, Branch Chief

Advanced Reactors Branch 2

Advanced Reactor Program

Office of New Reactors

Integral Pressurized Water Reactors

- Technology
  - Pressurized Water Reactors with nuclear steam supply components (e.g., steam generator, control rods, reactor coolant pumps) within the reactor vessel
- Current pre-application discussions regarding:
  - Westinghouse IRIS
  - NuScale
  - B&W mPower

Westinghouse IRIS

Reactor Power: 1000 MWt

Electrical Output: 335 MWe

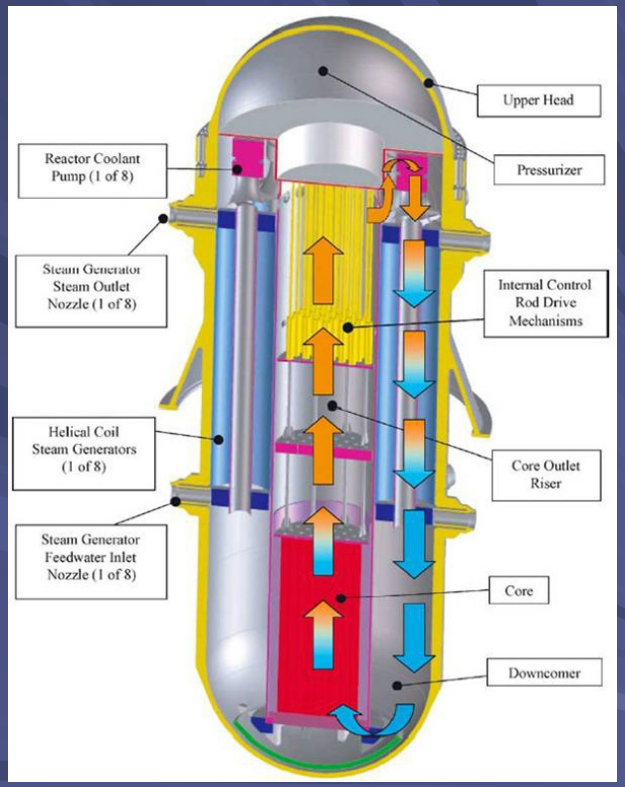
Outlet Conditions: 330°C

Coolant: Light water

Fuel Design: 17 x 17 assemblies
4.95% enrichment UO2

Refueling: 3-3.5 years

Licensing Plan: Design Certification



Westinghouse IRIS

- Engagement with NRC began in 2003
- International effort
- Report on Emergency Planning
- Report on Seismic Isolators
- Minimal recent interactions

NuScale

Reactor Power: 150 MWt

Outlet Conditions: 150 psig, 575°F

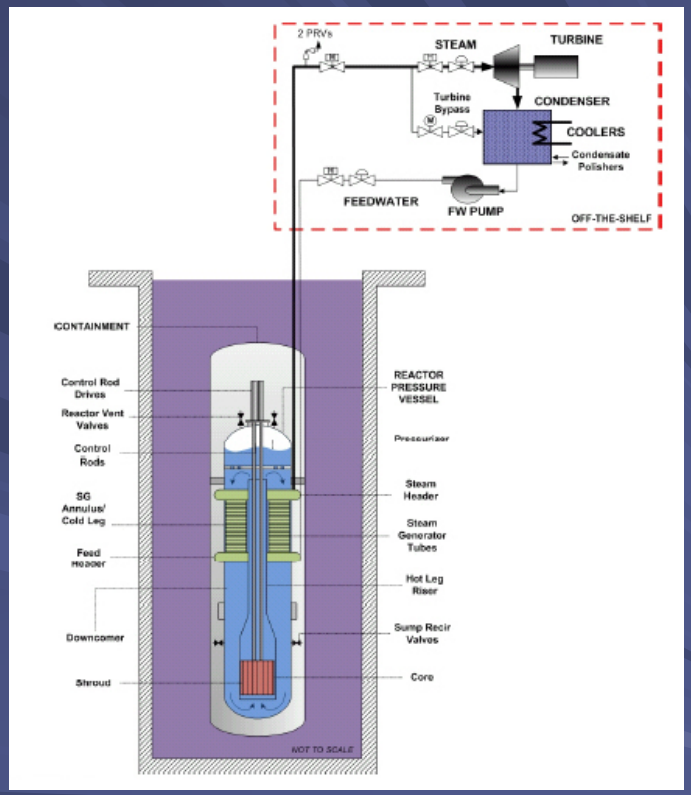
Electrical Output: 45 MWe

Coolant: Light Water

Fuel Design: 17 x 17 fuel bundles, 6', 4.95% enrichment

Refueling: 24 months

Licensing Plan: Design Certification



NuScale

- Began interaction with NRC in 2008
- Based on Oregon State University MASLWR design
- Report on codes and methods
- Report on refueling operations
- Significant recent interactions

B&W mPower

Reactor Power: 400 MWt

Electrical Output: 125 MWe

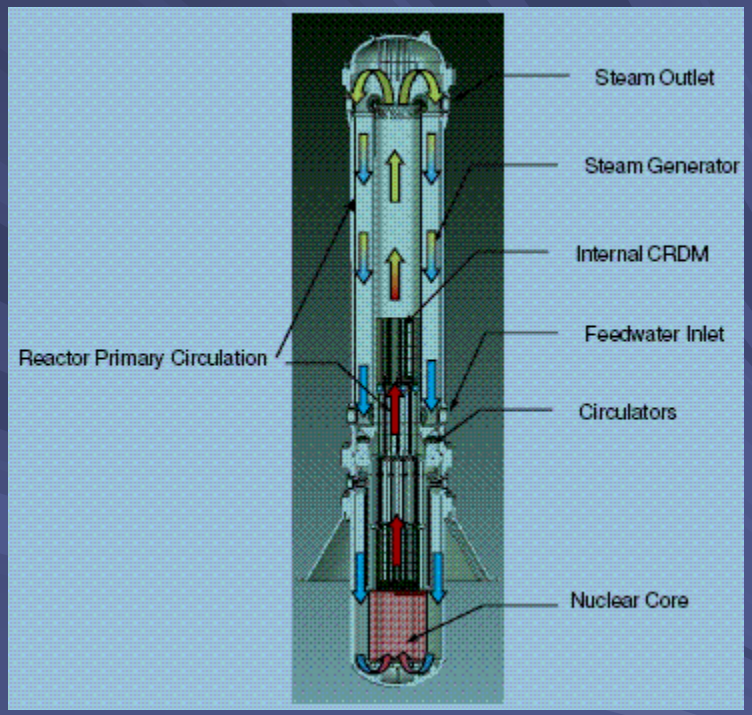
Outlet Conditions: 327°C

Coolant: Light water

Fuel Design: "Standard PWR fuel"

Refueling: 4-5 years

Licensing Plan: Design Certification



B&W mPower

- Began interaction with NRC in 2009
- Based on German ship *Otto Hahn* design
- Air cooled condenser
- Significant recent interactions

Integral PWRs – Current Activities

- Evaluating existing requirements and guidance to identify needed changes (gaps)
- Identifying significant policy and key technical issues
- Developing overall licensing plan that coordinates:
  - NRC confirmatory research & development of evaluation tools
  - Required changes to regulations, policies and guidance
  - Development of infrastructure and technical expertise for new technology

Other Technologies

William Reckley, Branch Chief

Advanced Reactors Branch 1

Advanced Reactor Program

Office of New Reactors

Sodium Fast Reactors (SFRs)

- Limited NRC activities
- Knowledge management
- Some pre-application interactions regarding:
  - Toshiba 4S
  - General Electric PRISM
- International interactions

Other Technology Groups

- Some interactions and/or aware of efforts related to various other designs:
- Generation IV
  - **Gas-Cooled Fast Reactor (GFR)**
  - **Very High Temp Reactor (VHTR)**
  - **Supercritical-Water Cooled Reactor (SCWR)**
  - **Sodium-Cooled Fast Reactor (SFR)**
  - **Lead-Cooled Fast Reactor (LFR)**
  - **Molten Salt Reactor (MSR)**
- Hyperion Power Module
- Accelerator-Driven System (ADS)
- Fusion & Fission-Fusion Hybrids

Infrastructure & Generic Issues

- Infrastructure
  - Organization & Staffing
  - Contracting Strategy
  - Training, Tools & Guidance
- Generic Issues
  - Address generic issues identified by NRC, industry, or other stakeholders
    - Generic to SMRs
    - Generic to a technology group or other subset of SMR technologies

Policy and Technical Issues

- Generic issues
  - Emergency Planning
  - Physical Security
  - Staffing requirements
  - Financial requirements (e.g., fees, Price-Anderson)
  - Modular/expandable facilities
- Technology specific
  - Fuel qualification
  - Materials qualification

Prioritization Factors

- Safety significance
- Affected technology groups/designs
- Impact on design
- Method of resolution
  - (research, legislation, rulemaking)
- Industry participation
- Schedule for prototype/commercial deployment
- Dependencies on other policy/technical issues

Future ACRS Interactions

- HTGR Research Plan (April 2010)
- Resolution of specific policy or technical issues
- Design or application briefings
  - pre-application/application
- Design or licensing reviews
  - SER with open items, draft final SERs
- Specific topics identified by ACRS or staff

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Briefing for ACRS on Topics of Mutual Interest

Office of the Executive Director for Operations
Bill Borchardt
Bruce Mallett
Marty Virgilio
Darren Ash

March 5, 2010

Overview

- Agency Overview – Bill Borchardt
- Reactor & Preparedness Programs – Bruce Mallett
- Materials, Waste, Research, State, Tribal, and Compliance Programs – Marty Virgilio
- Corporate Management Programs – Darren Ash

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Agency Budget Priorities & Trends

- FY2010 Budget
- Breakdown Across Programs
- Budget Trends
- Agency Priorities

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NRC Staffing

- Changing Workforce
- Knowledge Management
- Three White Flint North (3WFN)
- Collective Bargaining Agreement
- Future Challenges

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International Activities

- Bilateral Activities
- Multinational Design Evaluation Program (MDEP)
- Integrated Regulatory Review Service (IRRS) Mission

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Operating Reactors - Licensing

- Power Uprates
- Non-Power Reactors
- License Renewal Beyond 60 Years
- Medical Isotopes

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Operating Reactors - Oversight

- Inspection Program
- Buried Piping
  - Tritium
- Underground Cables
- Aging Management

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Operating Reactors – Oversight (Cont.)

- Reactor Security Rule
- Emergency Response Data System
- Cybersecurity Plans

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Operating Reactors – Oversight (Cont.)

- Operating Experience
  - Trends
  - Analysis
- Safety Culture

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New Reactors – COLA Reviews

- Applications
  - Status and Progress
- Challenges

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New Reactors – Design Certifications

- Applications
  - Status and Progress
- Challenges

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New Reactors – Vendor/Construction Inspection

- Vendor Inspection
- Construction Inspection
- Operator Licensing/Simulators
- Challenges

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New Reactors – Advanced Reactors

- Building Regulatory Framework and Infrastructure
- Potential Application Reviews
- Challenges

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New Fuel Cycle Facilities

- AREVA
- GE-Hitachi
- International Isotopes (INIS)

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Operating Fuel Cycle Facilities

- Integrated Safety Analysis Framework
- Development of New Oversight Program

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Integrated Spent Fuel Management Plan

- Extended Storage of Spent Nuclear Fuel
- High Level Waste Disposal
- Reprocessing

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Integrated Spent Fuel Management Plan (cont.)

- Near-term actions for Spent Fuel Storage and Transportation
  - Research to Support Long-Term Storage
  - Enhancements to Licensing Process

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Nuclear Material Users

- Source Security
  - Chairman's Task Force: 2010 Report to President and Congress
  - Part 37: Byproduct Material Security Proposed Rule
  - Policy Statement on CsCl

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Nuclear Material Users (cont.)

- Integrated Source Management Portfolio
  - National Source Tracking System (NSTS)
  - Web-based Licensing
  - License Verification System

- Revision to Radiation Protection Regulations

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Decommissioning and Low Level Waste

- Decommissioning
- Uranium Recovery
- Low Level Waste Disposal
  - Significant Quantities of Depleted Uranium Rulemaking
  - Blending of Low-Level Radioactive Waste
  - Revisions to Part 61

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Reconsolidating and Modernizing

- Three White Flint North (3WFN)
  - Status, Progress, and Opportunities
- Modernization of Existing Infrastructures
- Physical Access Upgrades

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Enhancing Public Participation

- Open Government Initiative
- Website Redesign
- Modernization of ADAMS
- Multi-Media Excellence Plan

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Managing Information Technology

- Sustaining Current Operations
  - Need for Balance
- Introduction of New Technology
  - Status, Progress, and Opportunities

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Working from Anywhere

- Staff Can Securely Access and Use the Systems and Information They Need, Regardless of Where They are Located

- Proven and To-Be Discovered Benefits

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Supporting Mission Performance

- Other Management Improvements
  - Strategic Approach to Contracting
  - Modern Approach to Training Techniques
  - IT Security
  - Disaster Recovery
- Measuring Success

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- Questions ???