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Future Plant Designs Subcommittee

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UNITED STATES NUCLEAR REGULATORY COMMISSION'S
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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FUTURE PLANT DESIGNS SUBCOMMITTEE

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THURSDAY

APRIL 22, 2021

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The Subcommittee met via Teleconference, at 9:31 a.m. EDT, Dennis Bley, Chairman, presiding.

COMMITTEE MEMBERS:

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ACRS CONSULTANTS:

MICHAEL L. CORRADINI

STEPHEN SCHULTZ

DESIGNATED FEDERAL OFFICIAL:

DEREK WIDMAYER

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P R O C E E D I N G S

(9:31 a.m. EDT)

CHAIRMAN BLEY: Good morning. The meeting will now come to order.

This is a meeting of the Advisory Committee on Reactor Safeguard's Subcommittee on Future Plant Designs.

I'm Dennis Bley, Chairman of the subcommittee. ACRS members in attendance are Joy Rempe, Ron Ballinger, Charlie Brown, Walt Kirchner, Dave Petti, Vesna Dimitrijevic, Jose March-Leuba, and Matt Sunseri.

I am pleased to welcome and introduce two new members of the committee, Professor Vicky Bier from the University of Wisconsin. I know she's coming but I don't think she's here yet. And Mr. Greg Halnon, who plays a (inaudible) experience, most recently as President and Chief Nuclear Officer at GPU Nuclear at FirstEnergy. Our consultant Mike Corradini is also in attendance.

Derek Widmayer of the ACRS staff is the designated federal official for this meeting. Ken Power of the ACRS acts as the backup designated federal official.

The purpose of today's meeting is to

continue our discussions with the staff on preliminary rule language for 10 CFR Part 53, Licensing and Regulation of Advanced Nuclear Reactors. We will discuss the staff's second iteration of Subpart B, Technology-Inclusive Safety Requirements; and Subpart C, Design and Analysis Requirements.

We will also continue our discussion of Subpart E, Construction and Manufacturing Requirements, that was begun at the March subcommittee meeting.

The subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate.

This subcommittee meeting is the fourth of several scheduled to discuss preliminary proposed rule language of Part 53. The subcommittee will meet next week, April 28th, to discuss possible topics for a letter report, an interim letter report on the proposed rulemaking language presented to the subcommittee in its first four meetings.

We have scheduled a session for the upcoming May full committee meeting to write an interim report.

The ACRS was established by statute, and it's governed by the Federal Advisory Committee Act, FACA. The NRC implements FACA in accordance with its regulations found in Title 10 of the Code of Federal Regulations, Part 7. The committee can only speak through its published letter reports. We hold these meetings to gather information and perform preparatory work that will support our deliberations at full committee meetings.

The rules for participation in all ACRS meetings, including today's, were announced in the Federal Register on June 13th of 2019. The ACRS section of the USNRC public website provides our charter, bylaws, agendas, letter reports, and transcripts of all full and subcommittee meetings, including the slide presentations.

The meeting notice and agenda for this meeting were posted there.

As stated in the Federal Register notice and in the public meeting notice posted to the website, members of the public who desire to provide written or oral input to the subcommittee may do so, and should contact the designated federal official five days prior to the meeting we talked about.

Today's meeting is open to public attendance. And we have received one request to provide an oral statement on the rulemaking language from the U.S. Nuclear Industry Council. We have also set aside time in the agenda for spontaneous comments from members of the public attending or listening to our meetings.

Attendees can provide comments to the NRC staff at the stakeholders meetings convened by the staff for that purpose, as well as through the rulemaking docket, and are encouraged to continue to use those avenues.

Due to the COVID pandemic, today's meeting is being held over Microsoft Teams for ACRS and NRC staff attendees. There is also a telephone bridge line for participation of the public over the phone.

A transcript of today's meetings is being kept, therefore, we request that meeting participants on the bridge line identify themselves when they are asked to speak, and speak with sufficient clarity and volume so that they can be readily heard.

At this time I ask that attendees on Teams and on the bridge line keep their devices on mute to minimize disruptions, and unmute only when speaking.

We will now proceed with the meeting. And I call on John Segala, Chief of the Advanced Reactor Policy Branch of NRR to make introductory remarks.

John, you may go ahead.

MR. SEGALA: Thank you and good morning.

Consistent with the Nuclear Energy Innovation and Modernization Act, or NEIMA, we are committed to developing a technology-inclusive, risk-informed, and performance-based regulatory framework for a wide range of advanced reactor designs, and publishing the final Part 53 rule by October of 2024, in accordance with the Commission's directive schedule. We are committed to a regulatory framework for advanced reactors that achieves the goals of the Commission's Advanced Reactor Policy Statement and the NRC's Principles of Good Regulation.

We are having extensive stakeholder engagement where we release preliminary rule language to solicit feedback to better inform the staff's proposals, and to ensure a shared understanding of what will be included in the final rule.

As we are considering changes to the previously-released preliminary rule language, we want to ensure that we have appropriately considered the feedback we have received from all stakeholders, including the public, industry, standards development organizations, trade groups, non-governmental organizations, and the Advisory Committee on Reactor Safeguards. Since we are at the early stages of the rulemaking process, the draft preliminary rule language will remain open for discussion as the staff works towards providing the Commission a proposed rule.

We are here today in the fourth of many ACRS meetings we will be having this year to seek ACRS feedback on NRC's development of Part 53 preliminary proposed rule language for advanced reactors. We previously briefed the ACRS subcommittee in January on the first set of preliminary rule language in Subparts B and F; in February on Subparts C and D; and in March where stakeholders shared their insights and we discussed the structure and logic of Part 53, key guidance needed for Part 53, and Subpart E on construction and manufacturing.

Today we plan to spend the majority of the meeting focusing on initial changes we have made in a second iteration of the preliminary rule language in Subparts B and C, considering the wide range of feedback we have received, and revisiting the key elements of the Part 53 framework in order to help set the stage for the ACRS full committee meeting scheduled on May 5th.

Since we understand that the ACRS plans to develop a letter after the May 5th meeting to inform the Commission of their initial views on Part 53 rule language, we plan to share our thoughts during our presentation today on some areas of focus for the committee's consideration as they draft their letter.

We are looking forward to hearing any insights and feedback from the ACRS today.

And that completes my opening remarks. Thanks.

CHAIRMAN BLEY: Thank you, John.

With this, I will now turn it over to Bill Reckley. I think he's ready to go. Is that right?

MR. RECKLEY: Yeah, that's right, Dennis. Thanks.

This is Bill Reckley of the staff. Liz, we can go to slide 2.

So, as has been talked about already, what our plans are for today is to go through some revisions to the language on Subpart B, which is the safety requirements, the high level objectives and specific safety criteria; and Subpart C on design and analysis.

And we will also talk this afternoon about Subpart E, construction and manufacturing.

Derek, there's a fair amount of feedback. I'm not sure if --

MR. WIDMAYER: Yes, I got it. I don't see anybody who has a mike open.

MR. RECKLEY: So, it's the telephone, I believe.

Okay. So, if we can go to slide 3, this is just our slide that we try to summarize the scope and our working schedule. And so, again, you can see the items that we plan to talk about today are our second iteration of the safety criterion design and analysis subparts. And then we'll revisit construction and manufacturing that we touched on last time but, given the time pressures, we thought we would revisit again today.

And then on the schedule part, as you go down the rows you can see that we are really shooting for by this summer to have the consolidated technical sections, which would be Subparts A through G, together so that people can get kind of the big picture and see how the different subparts interact and how, for example, operations is reflecting the safety criteria and how the design and analysis flows through the other subparts, siting, construction, operations, et cetera.

Then in the summer time frame --

CHAIRMAN BLEY: Bill.

MR. RECKLEY: Yes, Dennis.

CHAIRMAN BLEY: I wanted to ask you about one of those because I know some of our members have raised this issue.

We haven't really done the operations yet with you, but there was some concern with QA it might only be showing up under construction. Will it also be under operations? Or will you be talking about that now or sometime later?

MR. RECKLEY: We'll talk, yes, when we get -- I'll brief in the summary of operations, but yes, the way we have, as a first iteration -- and we have this under discussion internally -- but the way we've done it as a first iteration, we've taken QA and distributed it throughout each subpart. So, design has a QA element, construction obviously has a big QA element, and operations has a QA element.

We're talking now just as a matter of efficiency. Maybe it makes more sense to go back and put it all together as it is under Part 50. But that's really just a, largely a formatting issue. The applicable quality assurance requirements are being reflected in each subpart.

CHAIRMAN BLEY: Thanks. That's what the concern had been, so.

MEMBER KIRCHNER: Yes, thanks. Thanks, Dennis -- this is Walt -- for bringing that up.

That, yeah, I was going to ask that, Bill, whether or not with the input you've had from stakeholders and also your own work whether pulling that up into Part B wouldn't make sense. Because it needs to carry through, you know, the entire life cycle as you've laid this out.

MR. RECKLEY: Yes, right. I a hundred percent agree. And I think we're just looking at now what is -- what makes the most sense in terms of largely formatting. Repeating it in the different sections introduces a fair amount of the language showing up in multiple places.

So, we are looking at it, but from a big picture standpoint. We basically see, as it does now, quality assurance being an important element in every stage of design, operations, and so forth.

So, what I was going to add is in the summer time frame we will also start to introduce the licensing areas, Subparts H and I, and also the miscellaneous requirements that we're putting into Subpart J.

But I think one of the issues that we've had with stakeholders, and it was perhaps unavoidable the way we did this, by introducing individual subparts and then basically just having a trailer saying you're going to have to wait to see how this carries through, we're getting to the point when we release the operations section in a week or so where I think it will be a little more evident how the pieces tie together.

So, if we can go on, Liz, to slide -- the next slide.

As John mentioned, and obviously this is, you know, up to the committee, and as Dennis mentioned, it's an interim because everything remains in flux here as we're changing language and getting feedback from both the ACRS and stakeholders, and internal discussions, but we thought that a possible focus for the full committee discussion and the interim letter would be the overall structure. And we'll talk about that a little more.

And the second iteration language for Subparts B and C, and then, obviously, any observations, challenges, recommendations that the ACRS full committee would like to offer.

So, this is just a suggestion from the staff on what we, what we were thinking might be a possible focus for the committee and the interim letter.

CHAIRMAN BLEY: Thanks, Bill. And when you come in May, I think those would be the right things to emphasize with the --

MR. RECKLEY: Okay.

CHAIRMAN BLEY: -- full committee.

MR. RECKLEY: Okay. And that will be also reflected to some degree in what we're going to present today, obviously.

So, Liz, we can go down to the next slide.

This is the slide we've used in the past to show the structure. And I'm going to go through it again since we were thinking that this could be a focus are for the full committee.

So, number one is just the overall structure, how we put this together in terms of organizing the subparts.

And then the second item would be the second iteration language on Subparts B and C.

And then this afternoon we'll talk about Subpart E, the construction and manufacturing as just a continuation of the discussion on the subparts that we're releasing. And that would be the first iteration on Subpart E.

So, the next few slides -- and we used

these in the past -- is just going to quickly go through the subparts.

And, so Subpart A is the general provisions. And the most -- I don't want to say the most important thing -- the area that has the most interest is the definitions. Because as we go through the development of all of the subparts and try to use a common terminology, the sometimes similarity but slight differences to common usage or even historical usage under Part 50 has been an issue. And so it's pretty important for us to start to collect and use the definitions section of Subpart A to tie together all of the subparts. So, we'll be releasing that in a week or so, again, as a first iteration.

The rest of Subpart A has a lot of the material that is generally the same in Parts 50 and Part 52, and it would be proposed to be largely the same in Part 53 in terms of legal requirements on things like employee protection, completeness and accuracy of information, and so forth.

So, if we can go to slide 7, Liz.

Then what we will be talking about today is the second iteration of Subpart B, the safety criteria. And that, that is laid out, as the bullets indicate, into safety objectives, first and second tier safety criteria, then safety functions, license basis events, and defense in depth, and occupational exposures.

The chevrons on the right are trying to lay out as we go through the subparts the general structure and hierarchy of the terminology, since we don't have the definition sections released yet. So, so the safety criteria are the highest element.

And as we get into the specifics, when we get into the second iteration this may become more clear. But, for example, the safety criteria for the first tier is the traditional siting reference values, the 25 rem number at the exclusionary boundary. And then from that the structure is set up that a designer, an applicant, needs to identify what safety functions are needed to meet that, that criteria.

And then the next chevron down would be once you've identified the safety functions, then you need to make decisions on the design features, so the actual hardware.

And then once you've decided on the hardware you need to put the specifications or the functional design criteria to those design features.

And so, kind of quickly going down, the safety criteria again is the 25 rem for all plants.

Cooling is going to be a safety function. From cooling you might then say I'm going to do it through a, let's say, a pump and a heat exchanger. And then the functional design criteria would start to get down to here's the kind of heat removal, the kind of flows, the kind of specifications on the heat exchangers.

And then the same thing holds true then for the second tier. The safety criteria would be, as were proposed and as we'll get into in the discussion, the health objectives and the NRC safety goals. So that, that introduces into the second tier not only the capabilities of equipment but also the reliability of equipment because you have a probabilistic element.

But you can then go down and say what safety functions are needed to meet the QHOs. And they're going to largely be the same in terms of engineering speak, they're going to be the same type of things: I need barriers, I need cooling, I need reactivity control, and et cetera. Then you can go down and say what are the design features that I'm going to select to do that.

And then the functional design criteria are introduced as to how that system specifically needs to perform. And, again, since there's a probabilistic element, this is also where you start to introduce what the reliability of the equipment is.

So, I just wanted to kind of quickly go through this because we'll be talking about it as we go through not only the other subparts but when we get into the second iteration language.

So, if we can go to slide 8.

The next subpart in the structure is Subpart C, the Design and Analysis.

CHAIRMAN BLEY: Bill.

MR. RECKLEY: Yes, Dennis?

CHAIRMAN BLEY: I know it's not part of your presentation today, and I know we've asked about it before, but some of this becomes more specific, at least in the vision we've heard, through guidance. And I know you're not, or I don't think you're doing that yet.

Are you envisioning that in many areas you will have to come out with type of reactor-specific guidance on issues, or do you see guidance documents that will cover all technologies?

MR. RECKLEY: I think there will be both. And our current focus is on the guidance that is technology-inclusive, so that it would, it would be the higher level guidance on -- that would be useful to implement the rule on a generic basis.

But we also foresee that there will be technology-specific guidance because the way the different reactor types are going to fulfill functions, there might also be technical guidance on the specifics like we have now for light-water reactors on limits and the behavior of materials. Well, you're familiar.

There's over 200 regulatory guides for light-water reactors, and so a lot of that same technical guidance and an agreement between the staff and industry or individual designers will re-envision, will be necessary. But that will come later.

CHAIRMAN BLEY: Okay. And on the -- I know the general policy on developing new rules is to have the guidance ready when the rules come out. With the accelerated schedule you've been given, I expect that's not going to be possible.

But are there specific either technology-inclusive guidance documents, or even technology-specific guidance documents that you think will be in place at the time of the rule?

MR. RECKLEY: Yes, and we're working on that now.

For example, and we talked about it at the last meeting, the advanced reactor content of application guidance is considered to be key guidance. And we're trying to do that on a schedule such that at least the drafts would be ready at the proposed rule stage, and we could have the final guidance by the final rule stage.

Another area that we'll talk, I think, at the next ACRS meeting, we'll touch on it today, is in the area of staffing. And that, I think, will be another -- it's a complicated topic, and so we're talking that we will have it well underway by the time the proposed rule goes up, but even the draft guidance we may not have ready. But, it's so important that we would expect to have the final guidance done by the final rule, again because it's such a key element.

So, we're going through now and looking at the guidance documents, trying to come up with realistic schedules, establishing the normal goals that you mentioned, that at least the key guidance would be in draft form by the time of the proposed rule. That may not in all cases be practical, given the schedule.

And so, we'll have to explain where we are and how we think that guidance would be available by the final rule.

CHAIRMAN BLEY: Thanks. And one last question in this area for me.

As you're going to be under the same situation that the folks developing the computer codes to support design-specific work are under, and that is you can't have it all ready at the same time. So, have you been giving any thought to how you'll set priorities on design-specific kinds of guidance?

MR. RECKLEY: For now, the design specific guidance is largely being driven by the lead developers for the technologies and their submittal of topical reports.

CHAIRMAN BLEY: Okay. So that, anyway, I don't see you have a choice, but it's who's in line.

MR. RECKLEY: Yes. Basically, yes. And so that is -- and one obvious factor there is the DOE advanced reactor demonstration program and those two designs. But then there's also other designers submitting topical reports to support either the second element of the DOE program or, on their own, independent of DOE.

CHAIRMAN BLEY: Thanks.

MEMBER HALNON: Hey, Bill. This is Greg Halnon. Just a real quick question.

You mentioned the draft guidance and that all that may be available is the draft rule language. Do you at think that we'll at least have a projection, or index, or something that shows us what is at least in the pipeline for draft guidance relative to -- I know that some of the technology-specific stuff may not be there, but it would be nice to at least see what's forecasted as guidance versus rule language.

MR. RECKLEY: Yeah. And we're working, we're working on that now, but from internally at just our own resource management needs to look at what groups are available and, therefore, what guidance we might be able to prepare on what schedule and so forth.

So, yeah, we're actually working on that as we speak.

MEMBER HALNON: Okay. That might help us not ask questions that we know is coming, as opposed to going into something that's just not developed yet. So, that would help. Thank you.

MR. RECKLEY: Okay. So, within, within Subpart C, again this is we're going to talk in detail, so I won't spend too much time on this particular slide. Again, these first slides we're just trying to reinforce the structure because that was one of the areas we thought the full committee might look at.

So, it basically goes through the requirements and the filling out of those chevrons in terms of how do you define the functional design criteria. And goes into the analysis part and the analysis of the licensing basis events, the categorization of equipment, and assignment of special treatment and so forth.

And then the QA and interfaces.

And the third bullet there we'll talk about in more detail, is the application of margins to gain flexibilities in areas like emergency preparedness, siting, staffing, and so forth.

So, slide 9, Liz.

So, we talked about Subpart D with the committee. We're still on the first iteration and engaging stakeholders on this subpart. But it's the general siting, the evaluation of a particular site to either identify hazards and assign hazard levels, or to look at a site and say the hazard levels selected for a design are bounding; the population-related siting considerations; and the environmental considerations.

Slide 10, Liz.

We'll talk this afternoon a little more

about construction and manufacturing. As Dennis and Walt mentioned, this is, as one might expect, this is quality assurance heavy in both of these areas.

And one of the things that we talked about last time and we'll talk about again today is the manufacturing provisions because we really expect that there will be at least the potential for a shift and a higher focus on the factory setting and the likely use of the manufacturing license provision, which hasn't been exercised by the NRC in a long time.

And then the added topics of the potential and even likelihood that the factor setting would include the actual loading of fuel into the reactor and the transportation of the reactor fueled to a site for deployment. So we'll, and we'll talk about that this afternoon.

Slide 11.

So, Subpart F is operations. And we're going to probably talk next month to the committee about these, this subpart. We've broken Subpart F into three segments, if you will.

The first one is being tied to the hardware. So, this is the structure systems and components. And you can look down and see configuration control and the use of technical specifications for the safety-related equipment; configuration management for the safety-significant but not safety-related things that would come in through special treatment and reliability assurance programs; maintenance and repair; QA again; design control for the hardware.

The second segment, if we go to slide 12, within Subpart F is related to staffing. And we did provide the committee with a White Paper that kind of lays out just some of the background and some of the proposals that we're hearing that we will likely need to address within this, these sections of Subpart F.

One of the proposals is to move into a concept of operations philosophy where each design or application would need to prepare a concept of operations. And this starts to be somewhat similar to looking at staffing, somewhat similar to the way you look at the hardware, and really identify what are -- what is the role of the personnel in terms of preventing or mitigating events. And, therefore, how are they contributing to the first tier safety criteria, how are they contributing to meeting the second tier safety criteria?

And from that -- and, again, we don't have the details -- as the White Paper laid out, we, that's kind of we're recognizing what the problems are, what the challenges are. We haven't worked quite yet to fill in exactly how this will work.

But from that concept of operations, then define what are the requirements for licensed personnel, what are the requirements for non-licensed personnel? Is it practical to take this all the way to autonomous operation with no licensed personnel and, in theory, totally unstaffed?

So, those proposals are out there. Again, it's a little early to say how far we think this can go. But the foundation for it will have to be a detailed assessment by the applicants on exactly what is the role of personnel in meeting the safety objectives and the first and second tier safety criteria.

So, I think we'll talk about that White Paper at the next meeting that we have set up with the ACRS, the May meeting, the subcommittee meeting. And, or maybe June, I forget offhand.

But, one of the upcoming meetings we'll talk about that White Paper. And by then we may have given a little more thought on the actual rule language that would provide that flexibility. But and then maybe lay out the requirements in terms of what would be needed to justify those different possibilities. But then, as has been mentioned, this is an area where the guidance will be key in terms of how to prepare that concept of operations, and how to use its results to make these determinations.

So this is, again, a little preview of what's going to be coming up. But this is a, this is a major, major area for both the industry and for the staff.

So, Liz, if we can go to the next slide.

The --

MEMBER BROWN: Bill.

MR. RECKLEY: Yes?

MEMBER BROWN: Going through the summary, can I -- you don't have to go back to the slide, back under I would guess it would be under Subpart C, or even -- my guess would be under C. Where do we get around to generating under this new Part 53, general design criteria similar to what we have in Part 50 and 52, in Appendix A?

Is that going to be absent from this in this new technology-inclusive world?

MR. RECKLEY: Well, we'll get into it when we talk about the language in Subpart B.

My thinking is the way you get there is

that the safety functions -- and, Liz, if you want to go back to slide 7 -- the way you get there is that you go through this exercise. So, and this will be different in that, at least under the current proposal, you won't have the equivalent of the NRC establishing the general design criteria or design criteria per se, like is in Appendix A of Part 50, but what you'll have is the requirement for the designer to define the needed safety functions for every major inventory of radioactive materials that has the potential to lead to a release.

And so, under the first tier if there's an inventory that could give you 25 rem at the exclusionary boundary, be it the reactor, which is the traditional source, or a waste gas system, or something else, then they would need to say what safety functions are needed in order to prevent that or to control that release.

For the reactor we give as examples the fundamental safety functions, reactivity, heat removal, and then the ability to have a barrier to the actual release of radionuclides.

For something like a waste gas system, it might exclude cooling or reactivity control and focus only on the physical barriers to the release. But they would define the safety functions for that inventory.

And then form a technology- or design-specific approach they would move from those safety functions into what design features they're selecting. And so, for cooling you're going to have things like reactor cavity cooling systems or reactor vessel cooling systems, or more traditional heat removal systems. And then from that selection down to the functional design criteria on more specifically what that design features needs.

So, the concept is very similar. And as Appendix A, Part 50, the general design criteria are laid out and organized largely by those fundamental safety functions, we would expect that those same fundamental safety functions are going to apply. And all the history is at least for any reactor of size -- and this is every one we've seen that's in the, for instance, hundreds of megawatts, that the fundamental safety functions are the same.

One area that we're looking at, and this leaves some flexibility, is if the microreactors are able to show that some of the -- that they have less reliance on a particular safety function, this may, this may leave open that they could say cooling, for example, is provided by natural processes that don't even need an engineered system. But we haven't -- it has the potential, and we've heard people say that that might be possible. I'm not sure we've seen one yet where we would say that was possible.

But --

MEMBER BROWN: Bill.

MR. RECKLEY: -- so it gets to Charlie's point though, we think this gets you there. This is the equivalent, but we at this point are not envisioning the equivalent of an Appendix A.

Go ahead, Dennis.

MEMBER PETTI: Bill, there's a reg guide though, right? I mean, does advanced reactor design --

MR. RECKLEY: Yes.

MEMBER PETTI: -- and there was a tier that was technology-independent and then they broke into their own technology-dependent criteria.

MR. RECKLEY: Right.

MEMBER PETTI: Those parallel what's in Appendix A.

MR. RECKLEY: They both parallel what's in Appendix A. And we also think that for many -- and, for example, the gas-cooled reactor in that reg guide, Reg Guide 1.232, was largely based on the hundreds of megawatt sizes, as was the sodium-cooled fast reactor.

And so, what you would see if you look at Reg Guide 1.232, the advance reactor design criteria, is this -- you would see that you get to the same place as we think you get to here, although that was laid out under the format of Appendix A, the general design criteria, so it took that more structuralist approach that, hey, the designer can start here.

But we -- so, I guess the short answer is yes. And we don't really see the disconnect in that we think you end up in the same place.

CHAIRMAN BLEY: Bill, let me -- I'm sorry, Dave, I didn't mean to interrupt you if you wanted to follow up.

This is Dennis. But, yeah, there's some of the different areas, you know, you said it's new that the designer has to have these criteria, but we currently require the designer to come up with principal design criteria. But Appendix A says these will be the ones, unless you have something additional that you need to consider, or you make a great argument why one of these doesn't apply.

The argument you went through, if it's all in guidance, that is not a requirement.

MEMBER PETTI: Right.

CHAIRMAN BLEY: The process that you described somehow, in my opinion, ought to be somewhere in the rule so that the process is laid out and you really can't avoid going through that, that all. If it's all in guidance you might get anything back.

Is it anywhere in the rules that it will kind of lay out the argument you just made?

MEMBER PETTI: Bill, can I just amplify Dennis' comment for a minute?

MR. RECKLEY: Please.

MEMBER PETTI: I'll just use my area as an example.

When you start around general criteria -- and I think it's 21, 20 I guess, talks about protection systems -- and I'm not trying to be saying they've all got to look like what they are in the light-water reactors, that's not the point of the comment. But the upper level criteria are in the rules, that you've got to define the function, you've got to define the reliability and testability, and they have to be testable. They have to be independent. That's not, you know, technology exclusive. And you've got to be able to identify the failure mode.

So this is, like Dennis said, these are, these are in the rule. Guidance, I don't know how many times we've fought this issue in various meetings on some subjects, where you bring up an issue and they say, well, gee, that's just guidance, so we can kind of go where we want to go.

And the NRC then is kind of strapped for figuring out how do we make sure that we have separation of protection and control systems? Maybe they say, well, we want to combine them all into one integrated system.

The things they should be able to address, these are kind of time honored and true, and not just in my area, but I went through the rest of the general design criteria also before this, that they can be evaluated and then the principal design criteria that says that's why we don't need this.

And I think that was Dennis' point: they're in the rule as opposed to just in a set of regulatory guides.

CHAIRMAN BLEY: Not quite my point.

MEMBER PETTI: Well, maybe I'm a little off, but that's my point.

MEMBER KIRCHNER: May I jump in, Charlie?

This is Walt.

MEMBER PETTI: Go, Walt.

MEMBER KIRCHNER: I think so, too, Bill, that somehow the essence to the framework, so to speak, of the GDCs should be reflected in the rule. Otherwise all we have is guidance in that reg guide. It's good guidance but it's guidance, it's not a regulation requirement.

And to just pick out an example, natural hazards. All reactors, no matter what the technology, should be designed for the natural hazards. So, I don't have the GDCs open in front of me right now. Number 4, or whatever, I mean, that's a high level, cross-cut kind of requirement that in my mind should apply across the board to any advanced reactor.

And that should be reflected, in my own opinion, in the rule. Whereas the GDCs that are derived from the reg guide is, as you described, it creates a parallel system but it doesn't create the requirement that exists for these.

One of the things I've been doing is I've been stepping back and testing what you have versus what exists. And one of the objectives -- I guess we've got feedback from the mike -- seems to be, you know, the policy statements from the Commission and so on say that any advanced reactor should provide a level of safety equivalent or above the existing current fleet. And so that's why I keep bringing up things like QA.

How would you convince the public that you've got a design that provides an equivalent level of protection when you don't have these kind of GDC requirements for the reactor?

I mean, even if on paper they inherently have all these inherent safety characteristics, that doesn't mean when it's designed and built it actually provides a safer reactor.

CHAIRMAN BLEY: I'd like to take you back to my question, Bill. And that was you talked us through a process that you believe gets us to the right point. And I'd be happy to agree with that. But that's what I was getting at, shouldn't that process somehow be enshrined in the rule?

MR. RECKLEY: And when we get to the language of Subparts B and C I'll revisit this. And then I think the discussion can be is it clear enough that we've done that? Or, so I think we can try to address that when we get to Subparts B and C.

Again, we think we, we think we've done that because all of these things are in Part 53 as requirements. And, yes, there will be guidance on how to do it. But we think the requirements are there.

CHAIRMAN BLEY: Okay.

MR. RECKLEY: But whether that's clear and whether it's sufficient we can discuss once we get into, in particular, Subpart C, I think.

CHAIRMAN BLEY: That helps. Thanks.

MR. RECKLEY: Okay. All right. So, the third element or the sections under Subpart F in operations is related to programs. And these are the traditional radiation protection, emergency preparedness, security, quality assurance, programs for fire protection, and in-service testing and inspection, maintaining procedures, the facility safety program we talked about a couple months ago, and then a program to look at ageing, fatigue. That's the traditional cyclic limits, for example, that show up in requirements. And environmental effects.

So, and we'll talk next month. We're getting ready to release language on these.

And, again, I think it helps once we get into Subpart F to see how these things carry through from the design all the way through operations.

So, if we can go to 14.

Decommissioning. As part of the structure we thought it would -- is important because through all the life cycle, and so the decommissioning section would include the transition from operation down to possession-only license. It would include the financial assurance for decommissioning, and so forth. We've not really started on this section yet, so I don't have too much detail.

But there is a proposed rule on decommissioning that was recently developed. And so we would be looking to that to bring in the most recent thoughts on decommissioning.

Then slide 15 gets into the licensing areas. And basically we're going to address all of the avenues and combinations that are allowed under the current structures in Part 50 and 52. So, we would be looking at the potential for early site permits, limited work authorizations.

Related to the design of the reactor itself we'd maintain standard design approvals, design certifications under Part 52.

I've talked a little bit, and we'll talk more this afternoon, on manufacturing licenses.

And then when you look at the actual site-specific facility, we'll reflect the possibilities of doing a construction permit and operating license, or a combined license.

Then under slide 16, another aspect of the licensing basis information is maintaining it over the life of the facility. So, we'll address things like amendments to licenses. Currently that's done under 59(e) or the equivalent under Part 52.

Updating the final safety analysis report, updating the probabilistic risk assessment.

And then currently-existing requirements that will carry into this section on things like backfitting, revocation of a license or modification of a license, and so forth.

Then Subpart J is the kind of miscellaneous section. Some of the more, some of the sections that we're really looking to see how we can come up with this integrated approach. One of the areas is reporting, for example, and how reporting can be not an administrative burden solely, but also how it can be built into the overall structure of how we do licensing, how we do oversight and monitoring. And so that that's an area we're looking at.

There will be other areas like the financial qualifications, property insurance. A lot of the elements that show up under 50-54. The conditions of licenses would show up in this section, for example.

And then some of the more specific requirements that are currently in 50 and 52.

So, with that, let's go on then to the next slide.

That's --

CHAIRMAN BLEY: Bill.

MR. RECKLEY: Yes, Dennis?

CHAIRMAN BLEY: You've got three natural break point in the presentation, and this is one. I think this would be a good place for us to take a break, even though it's fairly early.

MR. RECKLEY: Yeah, I think that's, that's a good idea.

So, this was the first topic we wanted to go over. And, again, the primary reason to go through these chapters -- we'll get into the specific discussions later -- was the notion of this structure that we currently have broken apart into these subparts.

CHAIRMAN BLEY: Okay, thank you.

And, well, let me sneak one last question in before I declare a break.

Will the description of this structure be in Subpart A? It seems that would be helpful if it were.

But you don't have to answer that now.

MR. RECKLEY: It's not currently, but it's a good suggestion. And we'll, we'll -- it definitely will be talked about, for example, in the statement of considerations that would go with the rulemaking package.

I'll have to, I'll have to think about where else the structure would be explained. But --

CHAIRMAN BLEY: Okay.

MR. RECKLEY: -- we'll make a note.

CHAIRMAN BLEY: We're going to take a break now for 20 minutes. Please come back at -- before I say the wrong time zone -- in the East Coast 10:50. Back in 20 minutes.

And we're recessed until that time.

(Whereupon, the above-entitled matter went off the record at 10:30 a.m. and resumed at 10:50 a.m.)

CHAIRMAN BLEY: Okay. I'm calling the session back in order. And I want to mention that in the opening remarks I forgot to introduce our consultant, Stephen Schultz, who is with us today as well. Thank you.

Bill, you can go ahead.

MR. RECKLEY: Thank you, Dennis. So, if there's no additional questions or discussion on the overall structure or organization of the Part 53, we can go to slide 19.

So what I'm going to walk through is the second iteration of Subpart B. And I'll just give a little history of the changes and then try to focus on the language we arrived at for the second iteration.

So slide 20, just some background and observations, I guess. And I mentioned at the onset that we're having a little bit of a challenge because of the way we're doing this and both the iterative nature of trying to develop these subparts as we developed a total package, the release of those, and the discussions of the language.

So this is really kind of a novel approach that we're trying for this rulemaking. And it's been a challenge. But we thought it was needed in order to try to meet the schedule.

And I think we're getting into a rhythm now. It was hard to get it started. But I think the engagement with the stakeholders is getting to a point where the rhythm is understood. More of the package is available so people can start to see how the pieces of the puzzle fit together.

But just did want to mention, we know it's been a challenge for us. It's been a challenge for the ACRS. And it's been a challenge for the public stakeholders.

So we are facing that we're getting a lot of comments from both internal and external stakeholders. We are looking at those. We did try to focus on maybe the more fundamental ones in coming up with the second iteration. But we know that there will be additional iterations as we go forward.

And part of that, we can talk about things like we were just talking about with the concept and the potential benefits of putting in something closer to general design criteria. And we can talk about where that would fit now that we have some more of the subparts available for people to look at. We've set up management systems for briefings and approval of the release of the language.

As I mentioned early on, it's a moving target, because as we develop subparts and as we get into the licensing arena and Subparts H and I, we're likely need to go back and make other changes to the technical requirements in the subparts we're talking about now, feedback and insight.

So we are continuing to assess the

comments and mature our own thinking, to be honest. And so, although this is the second iteration, we expect many more even on Subparts B and C.

The last one is, one of the things we wanted to make sure people understand is the package that we're preparing now is a proposed rule to the Commission.

And part of that process is also to flag to the Commission, who's the ultimate decision maker on whether to proceed with the proposed rule and the language that we're proposing, is to put questions for possible comment from stakeholders and to identify to the Commission themselves what are some of the challenges and some of the decisions we made so they can take that into consideration and proceed or revise or tell the staff to revise the proposed rule before its publication.

So we're at that stage. It's a relatively early stage still of developing this rulemaking.

So, if we can, go on to 21, Liz. We used this slide last time. I thought I would just revisit and take a couple minutes to show it again.

And the, what we're trying to communicate somewhat is a comparison of the licensing frameworks between Part 50, the current one, and Part 53 that we're proposing and show some of the places where they're similar and some of the places where the approach that we're taking is a little different. And there's a reason. And in this slide we'll try to say why it's different.

So the highest level, the first bullet, the safety criteria themselves are the same. We are using the same reference values, the 25 rem over 2 hours at the exclusionary boundary or over the course of the event at the low population's own boundary.

We're using the same NRC safety goals. Albeit, in Part 50, the safety goals don't show up as a specific technical requirement. Under 52, they don't show up as a specific technical requirement, but because of the requirement to have the PRA, they are looked at as part of the licensing process.

And although they may not be in Part 50 as a technical requirement, they are used in guidance associated with regulatory processes, like doing a regulatory analysis. They are used in the reactor oversight program.

And they are used in risk informed licensing decisions under Reg Guide 1.174 and to some degree under 50.69, if you're taking that option in terms of treatment of structures, systems, and components. So, but they are the same underlying safety criteria.

In the design and analysis area, the evolution of the design-basis accident in Part 50 is a fairly prescriptive, conservative analysis of primarily the large break LOCA, or there is other assessments that are also included that reflect the technology of light water reactors, the need for a very quick insertion reactivity, for example. And those analyses tend to be fairly prescriptive and conservative.

In Part 53, the DBA is reached through a systematic assessment. It's not predefined as it was for light water reactors through either the standard review plan or ANS design standards 51.1 and 52.1, which was a large basis for most light water reactors.

But given it's a technology inclusive approach, we couldn't predefine them. So we lay out a methodology that uses either the, and we'll get into this, either the probabilistic risk assessment or another systematic approach to look at and identify a DBA.

And it has some of the same things that Part 50 has done, for example, only safety-related structures, systems, and components. But the, some of the conservatisms have been reduced.

And that is because the next bullet, Part 53, increases the requirements on the assessment of beyond design-basis events, where in Part 50, that was done on a case-by-case basis.

And some things imposed for things like anticipated transient without scram or station blackout, there was not necessarily a, from the licensing perspective, a systematic assessment of beyond design-basis events. And the history of that going all the way back to the Atomic Energy Commission is available.

But under Part 53, again, the proposal is that the beyond design-basis events are systematically looked at. And those event scenarios are explicitly considered. And an applicant needs to address those event scenarios with plans, including special treatment for non-safety related but risk significant SSCs, identification of human actions, and so forth.

So that's a little bit of the difference in the structures and how one reaches the safety conclusions under Part 50 and Part 53, again some similarities and some differences, especially when one looks at the treatment of the beyond design-basis event category.

So, going on to slide 22, the first tier, and as a note --

MEMBER MARCH-LEUBA: Hey, Bill --

MR. RECKLEY: Yes.

MEMBER MARCH-LEUBA: -- go back please. Jose. Go back to 21. Why do you require uncertainties for beyond design actions and not for DBAs?

MR. RECKLEY: Well, the assumption under the DBA is that it would use much of the guidance that's available. And so there are conservatisms built in for the DBA that, and address the uncertainties through things like the validation of the codes, for example. And so --

MEMBER MARCH-LEUBA: But they're not reflected on the rule. Those are things that you expect we'll inherit from Part --

MR. RECKLEY: No, we would expect -- if the wording is not clear, then we'll have to tweak it. But, yeah, we would expect the same certainty in the assessment of the design-basis accident in terms of the confidence in the computer models and so forth and the comparison of it against the design criteria that exists in Part 50.

MEMBER MARCH-LEUBA: Yeah, it reinforces

what my colleague said earlier this morning, expectations that are hidden, it would be much better if the rule language was explicit to what I need to do as a reactor designer.

MR. RECKLEY: Okay --

MEMBER MARCH-LEUBA: Let's not revisit that. We've gone through that the whole morning.

But in my opinion, again talking with, broad before, analyzing the DBAs or even the beyond design-basis is not the difficult part. We know how to do it. It may cost money, may cost time, but we know how to do it. The difficult part is identifying which events are the design-basis events.

Do you have a complete set, because you have an intellectually satisfying statement. You pick all the events that have a frequency greater than, say ten to the minus 4. But how do you know that's a complete set?

So there needs to be some at least guidance that identify in the design-basis events. It is crucial. And you cannot just do it by taking the existing SRP and removing the things that don't apply to you.

You have to think of what is different in my plant, because the standard review plan has to review the light water reactors over the last 50 years. And we have a very complete set of events. Because through crowdsourcing, I mean, graduate students in Lithuania and professors in Thailand have been assigned this problem. And it would be hard to figure out an event that we have not considered.

But with these new advanced reactors, we don't have any operating experience. We haven't even been thinking about them that much. So identifying everything that could possibly go wrong is crucial. And that part I don't see it anywhere in the rule.

MR. RECKLEY: Okay. When we get to the language, we can talk about whether we've captured that. We think we have. But again, it will get down to the wording I guess. So we'll have to make sure the wording is perfectly clear.

So, if we can then go on to slide 22. So the first tier, and what I was going to mention is we are looking at the language. One of the comments we got was just on the terminology and calling it tiers and the possible confusion with the way that language is used within Part 52 licensing and also the possible perception that the first tier implies importance in comparison to the second tier.

And so we're looking at considering the

language. So please don't read too much into our tier language. It might end up being criteria A and criteria B, as opposed to first tier and second tier.

But for what we currently call the first tier, we're looking at that as establishing a way to provide a minimally acceptable level of safety. And it would be met by the traditional comparison against the siting criteria, the 25 rem number I've mentioned at the exclusionary boundary.

It provides the basis for the classification of structures, systems, and components in terms of the safety related equipment if it were needed to keep the dose below 25 rem.

It would be used to demonstrate meeting the higher level safety criteria through the performance of the design-basis accident. And we'll get into that in Subpart C.

It goes to Walt's comment earlier. And hopefully we can show exactly where the requirement is for the equipment in this category to be protected up to design-basis external hazard levels. So that brings in the equivalent of GDC 2 in terms of the protection of equipment from external hazards.

As we'll get into with the language, we are aligning this set of requirements with the case law associated with the appropriate content, the technical specifications. And that, the language from those cases used the terminology such as it's reserved for the most safety significant requirements.

And it addresses those things that are necessary to obviate the possibility of events giving rise to an immediate threat to public health and safety. So we'll get into this in the next slide or two.

And then the last bullets, we are looking at these safety criteria, the design-basis accident, and the role that it would play in making decisions in other areas such as for staffing.

So, if we go to slide 23, it's the same general list except it's now associated with the second tier or the second grouping. And we're using it in this two-pronged approach, that in combination with the first tier, it ensures an appropriate level of safety for long-term, risk informed operations.

And the criteria, as we talked about last time, that we're using is the health objectives from the NRC safety goal. The demonstration of this is, needs to be through a systematic assessment. And again, we'll talk about that under Subpart C, the analysis section, and how that also carries over to the design-basis accident.

It provides the basis for identifying other risk informed requirements. This is going to be the requirements on structures, systems, and components that are helping to control the risk but are not necessarily the first line systems for keeping the dose below 25 rem.

Again, it identifies, it will support the identification of special treatment requirements. And it really provides the basis for a risk management approach to operations.

And this goes to being able to split, for example, the safety related equipment and the tight controls of that equipment through technical specifications, and then the most likely larger set of structures, systems, and components that play into showing you meet the risk metrics, the QHO.

But you would have, a licensee would have more flexibility in that area as they're provided by 50.69, the regulatory treatment of non-safety systems in similar things that have been introduced but not necessarily introduced in a, as structured a way as what we're proposing to do under Part 53.

And then the last couple bullets --

MEMBER PETTI: So Bill --

MR. RECKLEY: Yes.

MEMBER PETTI: -- just a question on the QHOs. If they're in the rule, does that not imply that one needs to do a quantitative risk assessment to get actual numerical values to compare against the QHOs? Whereas the language on PRA, the changed language implied that you could do, use other techniques. But it was never clear to me whether you had to go all the way to, you know, definitive numerical calculations.

MR. RECKLEY: The current language, and we'll get to it in a slide or two, but the current language on the second iteration is you still need to do the quantitative assessment. So, and if you don't mind, Dave, I'll just --

MEMBER PETTI: Sure.

MR. RECKLEY: We'll get to that in a couple slides.

MEMBER PETTI: Sure. That's fine.

MR. RECKLEY: Okay.

MEMBER PETTI: Yeah, no, that's good. Okay, okay.

MR. RECKLEY: So, okay. We can go on then to slide 24.

MEMBER KIRCHNER: Bill, this is Walt. Can

I just back you up to 22?

MR. RECKLEY: Sure.

MEMBER KIRCHNER: And, yeah, I misspoke I think this morning when I talked about GDC number 4 instead of 2.

But you've got, so you -- by implication in that middle bullet, external hazards, that's essentially GDC number 2. Why would you not include internal hazards, which is GDC number 3 and 4, 3 being fire protection and 4 being things like, you know, a pipe break and other internal hazards that would jeopardize safety related systems?

MR. RECKLEY: And again, when we get into the language -- and maybe we'll have to actually pull up the language, because I'm not sure I have it captured on the slides. But we do think we capture those things in the requirements.

For example, fire protection we call out specifically and give the option for it to be -- I'll acknowledge we don't talk enough about fire protection in this iteration, but we have a placeholder and basically state how it can be done either through the PRA, if you want to do a fire PRA, or if not done by the PRA, you need to do it another way. But all we have is a placeholder for that. And that --

MEMBER KIRCHNER: Yeah, well, it shows up in your framework and operational.

MR. RECKLEY: Right.

MEMBER KIRCHNER: It's highlighted --

MR. RECKLEY: Right.

MEMBER KIRCHNER: -- as separate bullets.

MR. RECKLEY: Yeah.

MEMBER KIRCHNER: But I'm thinking --

MR. RECKLEY: Right.

MEMBER KIRCHNER: -- more of the design --

MR. RECKLEY: Right.

MEMBER KIRCHNER: -- and the safety related systems, SSCs that are needed to meet the 25 rem.

MR. RECKLEY: Right. And so, again, we know under the design we mention it and it's a placeholder. And others have said that it may be not addressed through a PRA, for example. And so we need to beef that up.

We probably should have made a note or something in the rule language that said, you know, we know a bullet saying fire protection is not enough. But we'll get to that language.

In terms of other things like internal events and harsh environments, again, we have language where we think we capture that. And we can pull up the actual language and look to see that it's either clear, and if it's not clear, that would be an area we need to beef up.

But the language in the design section says you need to evaluate the environments that we capture in part, the harsh environments. And then there's another provision that talks about things like the equivalent to 2 over 1, for example.

So, but maybe we can get to that --

MEMBER KIRCHNER: Okay. Thank you. I'll wait. Yeah.

MR. RECKLEY: Okay. And it may be appropriate at some point to actually pull up the language instead of the slides, but, especially when we get to the design section. The Subpart B we basically have the language here because it's such a high level. So the --

MEMBER BROWN: Bill?

MR. RECKLEY: Go ahead.

MEMBER BROWN: Yeah, this is Charlie. Safety functions in the original versions was the lead-in, in other words, primary functions, safety function is limiting the radioactive, et cetera, et cetera.

And now it's been moved multiple sections down as if it's got, the criteria don't have a reference within which they're developed. I'm just curious why you moved it. And I've forgotten. I've got it, page, the pages in here somewhere.

MR. RECKLEY: Yeah, the logic there -- and it's how one's brain works. And so I organized it the first way where I put functions first. But under internal discussions, largely we thought it made more sense to put the criteria first and then say the functions are how you meet the criteria.

And so we just moved it from 210, where it was the second element, to 230 where now it's the fourth element. And we talk about the safety criteria first and then talk about the functions needed to meet the safety criteria.

But otherwise the language is the same. I wouldn't read too much into the fact that we just moved it. We thought it read better coming after the safety criteria.

MEMBER BROWN: Well, you can see how my brain works. I was exactly the opposite. The limiting the release is obviously the top level type thing. And then the criteria would help establish how you, kind of how you do that and what they are.

MR. RECKLEY: Yeah.

MEMBER BROWN: So that's the way my brain functions. So --

MR. RECKLEY: Well, maybe it's the same as mine, because I organized it that way first but then was, but we --

MEMBER BROWN: You had another comment in there also about -- and I'm not sure I understand this as well, if I can find the right place. I clicked the page at one point. Crud.

It was a comment relative to, it's under -- oh, no, that's the wrong one. It was the AEA, there was a comment or a, in the discussion part about how the stuff in the AEA was not going to be --

MR. RECKLEY: Right.

MEMBER BROWN: -- incorporated into this rule.

MR. RECKLEY: Well, yeah, let's -- actually, that's the slide we're on. So let me, let me try --

MEMBER BROWN: Oh, it is?

MR. RECKLEY: Yeah, let me try to --

MEMBER BROWN: Okay.

MR. RECKLEY: Let me try to answer that and explain why we changed what we changed.

So the first iteration of the safety objectives, the first technical requirement, if you will, was that the objectives were to show reasonable assurance of adequate protection of public health and safety, common defense and security. And in addition, each advanced plant would take such additional measures to protect public health and safety and minimize danger to life and property.

So that language was largely taken out of the Atomic Energy Act in the traditional findings that the NRC makes and the authorities given to the NRC under the Atomic Energy Act.

That proved, and those that have been around a while understand that the way this was interpreted by many -- and it was, really what we had in mind was to define in technical terms adequate protection and define a standard, and then say in addition to that standard, the NRC is able and has historically exercised the other sections of the Act that enable us to put requirements on above and beyond the adequate protection standard.

But that history, for those that have been around, it's a very controversial notion to actually define adequate protection. And so we, this proposal in the first iteration just got wrapped up into that history and the controversies.

People, some stakeholders didn't like the language out of the Act referring to minimized danger, fearing that a word like minimized would not necessarily reflect the cost-benefit nature that NRC uses when it exercises that authority through the backfit provisions. And so, and most of you know the history of backfit and all the controversies associated with that over the years.

There were questions and challenges of exactly how this fits into the actual safety criteria that we have in the next sections and some concerns about pulling the language directly from the Atomic Energy Act.

And so, hearing all of those, we changed the objectives. And if we go to slide 25, you can see what we are proposing for the second iteration is that the objectives are to limit the possibility of an immediate threat to public health and safety, and secondarily or in addition, that the requirements are to take such additional measures as may be appropriate when considering potential risks, and then explains further these objectives are met by the following two safety criteria.

And so we think this is more clear. It

keeps the alignment technically, because when we get to the next section you can see we didn't change the actual safety criteria, because the original thinking was that when you went across all of the subparts, when you got to the technical specifications, they were going to align with the first tier safety criteria, which was, as it was originally explained, aligned with the adequate protection finding.

But that became -- so we were able to make this change to the objectives thinking it makes more sense. It actually is actually more understandable I think to most people that you have two safety objectives.

The first is to make sure that continuously and constantly the plant as it's being operated poses no immediate threat to the public health and safety. And then, but that's not in and itself sufficient. And so additional risk reduction measures are needed. And we'll get into that when we talk about the first and second tier safety objectives. So this is the second iteration of the objectives, just moving it from the language of the Act.

Now, I think, Charlie, and we've had this observation that we're removing the connection. The underlying authority to the NRC, the underlying legislation for us remains the Atomic Energy Act.

We still, when we do a review, we'll be making a finding, as we traditionally have done, of reasonable assurance of adequate protection. We still will use the authorities in Section 161 to go beyond the adequate protection standard if it's appropriate to do so.

We just aren't incorporating that language and associating that language directly with the safety criteria that we're going to talk about on the next two slides.

So it's not separating us. What we found was when we tried to integrate, fully integrate the rules with the Act, it became too complicated, too controversial.

And so we're just taking a step back, basically not changing, as you'll see, not changing the technical approach we're taking, but, and in the end, from a legislation and legal construct, not changing any of that either.

Again, we'll still make the findings and follow the Atomic Energy Act and reference it where appropriate. But anyway, I think I'm starting to repeat myself. So that's the second iteration on the objectives.

MEMBER HALNON: Hey, Bill, this is Greg. Just a couple suggestions. When you're taking this around and critiquing it internally, there's a couple of words, obviously, that have variable opinions on what it could mean when maybe a significant change in design and/or cost of design could be, and that's the word "immediate" and the word "threat." It could mean different timeframes to different people. Threat could mean different things to people depending on how severe it is.

The other test I would ask you to take a look at is the back-fit, potential back-fits down the road and how that language may be used for any argument that could be a back-fit so we'd guard against any of these long-term confusing discussions that we had relative to back-fit issues down the road.

MR. RECKLEY: Yes. And that'll be -- when we get to Subpart I, we'll talk about the back-fit, and we'll get to the first question, I think, on the next slide. And the last bullet here is, "These objectives shall be carried out while meeting the safety criteria below." So if we can go to the slide 26 -

MEMBER REMPE: Actually, before you do

that, if I could interject? I had a question about the word changes, too. I understand why you did it and it does make sense with the subsequent material and your explanation helped today, but I'm just wondering if a person had an advanced non-LWR, could they have the option still to do other Parts, 50 and 52, or Part 53, or is there a different criterion to get into Part 53 because you've had embedded in your idea in generating this Part 53 that the reactors would be safer and if the new hypothetical reactor design is not really safer but they see an easier path by going through this because of the embedded assumption it is? Do you see where I'm going, because of the way the words have been changed? Does that make sense what I'm trying to convey?

MR. RECKLEY: Yes. And we'll -- the minimum scope for the rule was set out by the -- by Nuclear Innovation and Modernization Act, NEMA, and it basically says in any plant that has some attributes, improved attributes in a variety of areas compared to anything under construction in January 2019. And so that's the minimum set. We're talking internally and with stakeholders about whether there would be any expansion of that to include even the Generation III-plus designs. Our initial in the rulemaking plan, we said we weren't including Gen III-plus but anything else basically, so anything beyond.

MEMBER REMPE: Let me give a different example. What if they came in with the Clinch River Breeder Reactor, and it's such a large monster, sodium fast reactor, it doesn't have the enhanced safety. Could they go to Part 53? What I'm trying to see if we've embedded in our rulemaking language something that is a gate in for the non-LWRs or some reactor designs that are not really safer but they got into this pathway because of the language, and they have an easier path. Does that -- that's where I'm kind of coming from.

MR. RECKLEY: Okay. And we'll talk about this somewhat when we talk about the analytical margins provision in Subpart C. So --

MEMBER REMPE: Okay.

MR. RECKLEY: -- the thinking is that more or less, given the attributes defined by NEMA include fuel utilization, economic and safety, that they could -- almost anybody could make a rationale that they make some -- one of those attributes. The term they are safer, the way we are looking at it is the safety is provided by the whole integrated set of requirements. And part of that for large light-water reactors is, for example, emergency preparedness and the ability to evacuate people. It is provided by the need to have severe accident management guidelines and training and -- of the personnel to handle those kind of severe accidents. It's handled any number of ways such that an existing light water reactor meets basically the same criteria that we're laying out here.

For an advanced reactor, under the advanced reactor policy statement, the thinking has been when looked at as an integrated set of requirements, the safety is comparable. How you get to that is different in that you put more focus on the design and less reliance on human actions, less reliance on emergency planning provisions, less -- perhaps less on severe accident management provisions and so forth.

So overall, the safety is the same. How you achieve it is different. And so the quick answer is if a non-light came in and had some advantages in economics, fuel, whatever some of the NEMA attributes are defined other than safety, yes, they would be allowed to do this. But they may need to have emergency planning similar to large light-water reactors. They may need to have severe accident management guidelines. They may need to have a large operations staffing contingent. They may -- so they may look, from the outside, much more like how we're regulating large light-water reactors, and all of those things would still be needed. But we'll get to --

MEMBER REMPE: So it sounds like in your mind, you've got a risk-based criterion on which the -- you know, a level they've got to meet somehow or other and how that's implemented will yet to be determined as we see some examples. But I hope it's documented somewhere what you're saying, that they're going to have to do this.

MR. RECKLEY: Right, okay. And again, this is what we're thinking and I'm sure the language will need to be improved to make sure all of these things are probably more clear than they are now. But that's we have the rest of the year to refine the language.

MEMBER REMPE: Thank you.

MR. RECKLEY: So on the second -- let me see, that's 25. Yes, if we can go to 26. So the way the first tier was changed, again, the -- this is the first iteration language. We had a normal operations provision at 100 millirem from Part 20. We had the reference values traditionally used, the 2-hour dose, the exclusionary boundary being less than 25 or the duration, dose below 25 rem at the low population zone boundary. And then we added in the first language a statement that the Commission could put in additional criteria if it felt it was needed for reasonable assurance of adequate protection. And that's the only -- the reason we had that there was because this first tier was tied to the adequate protection standard.

So if we go to the next slide and the second iteration, you can see that the only change we really made was to delete C because that's no longer needed. We're no longer tying the safety criteria, the first tier safety criteria to reasonable assurance of adequate protection. It's now tied to the immediate threat to public health and safety which we are saying -- for this rule, we're saying that is the reference values of 25 rem over 2 hours at the EAB or over the duration at the low population zone. So --

CHAIRMAN BLEY: Okay.

MR. RECKLEY: Go ahead.

CHAIRMAN BLEY: Yes, it's Dennis. You mentioned the Commission several times this morning, and I didn't want details but are -- given this new approach where you're interacting with us at least monthly and with the public the same way, are you having interactions with the Commission, or are they waiting until this gets pulled together before they really look at it?

MR. RECKLEY: There's some communications and if you listened to the Advanced Reactor Commission Meeting last week, you can tell that it's on their radar.

CHAIRMAN BLEY: Yes, I saw that.

MR. RECKLEY: So there are some discussions through management channels and so forth. We're not putting up any interim products directly to the Commission. They're -- but basically, they're watching, as are all the other stakeholders, what we're putting out in these iterations. And so yes, they're paying attention, but we don't have the formal interactions if that's what you're asking.

CHAIRMAN BLEY: Yes, thank you.

MR. RECKLEY: So that really is the interaction on the first tier that really, the only change was associated with the adequate protection standard. We also did add the -- an existing footnote. We might refine it over time but it's the same footnote that you'll see in Parts 50 and 52 trying to explain the use of the 25 rem as a reference value, you know, basically trying to make sure no one interprets that as we think 25 rem is, you know, a fine number for people to get. It is just a reference value used in this context for the criteria associated with no immediate threat to public health and safety.

So if we go on then to slide 28, the second tier was originally put out as the normal ops were -- the criteria was as low as reasonably achievable, and we had words as a placeholder from Appendix I of Part 50, which is an old requirement establishing performance goals to meet ALARA for large light-water reactors. And the unplanned events were addressed by saying that design features and programmatic controls needed to address the licensing basis events and defense-in-depth, which are provisions or sections coming up and also to maintain the overall cumulative risk below the QHOs.

And comments we got ranged from there was no need for the second tier. A lot of comments from industry organizations saying we shouldn't include ALARA requirements within the second tier, and a fair amount of discussions on whether to use the QHOs, whether to represent the QHOs in words as opposed to actually including the quantified objectives themselves in terms of the numerical values, and some proposals for alternatives in the second tier.

Our -- go to 29. Our second iteration in terms of the comment on ALARA was to maintain it. What we think is part of the issue is some of the history associated with including ALARA within the initial design reviews for either design certifications or combined license applications more recently. But the concern actually even goes back further than that in how it was done under Part 50 licensing. So it's a longstanding concern of how we've looked at ALARA at the design stage and how much work has been put into those activities to support the staff's review.

And so one thing that we've done is in a parallel activity associated with the Advanced Reactor Content of Applications Project is to develop guidance where we try to point the staff, in large part, to take more credit for programs and kind of a performance-based approach for things that can be done under normal operations that basically would say do less detail of your ALARA provisions in the design documents, NRC staff do less of a review of the design in terms of ALARA and put more focus on the fact that this will be a monitored area, and we can put more focus and credit those monitoring programs. And if the releases to the public through normal operations are increasing, then, you know, an alarm can go off. If the staff feels that during operations, they're not taking a good faith effort to keep the doses as low as reasonably achievable, we can do it through the program as opposed to looking at the design.

So we're trying to accommodate the concern about ALARA and design by shifting, in part, the focus over to monitoring in a performance-based approach.

CHAIRMAN BLEY: Have you presented this revision and discussion to the stakeholders yet or is it first coming out today

MR. RECKLEY: No, they've seen it.

CHAIRMAN BLEY: With comments from them about --

MR. RECKLEY: They still don't like ALARA in the rule. They -- I shouldn't say that -- they want ALARA to be a policy, a philosophy, but the feedback was they still are not in favor of it being incorporated into the rule.

CHAIRMAN BLEY: You don't have any past guidance or information on (audio interference), I don't think, do you?

MR. RECKLEY: Well, to some degree, our view is the ALARA requirements, and they're largely contained in Part 20, are applicable to every NRC licensee, byproduct material, source material, special nuclear material, and as a subset of that, the utilization facilities using special nuclear material. So we would basically see no rationale, to be honest, as to why this class of licensees would be the only class of licensees to which ALARA wasn't applied.

CHAIRMAN BLEY: And some of this stuff we heard from some of the stakeholders in this area. They pointed to having it in Part 20 should be good enough, and I guess a concern I would have is if we replicate anything from Part 20 in the new Part 53, then you got to keep things in parallel in a way that you could avoid if you just refer to Part 2, but --

MR. RECKLEY: And yes, actually, most of the places where we -- where it's associated with normal operations -- that's a good point, Dennis -- we have made the editorial change to point to Part 20 as opposed to paraphrasing or repeating Part 20. So that is a change we made, but it doesn't change the underlying technical requirements, but it does, as you said, makes more clear and avoids a future issue by having a requirement worded slightly differently in two different places.

MEMBER HALNON: One of the problems is the subjectivity of the word "reasonable." That's probably where the industry is coming from relative to putting I in the design. If you put it in the design criteria or design requirements that you've designed your plant ALARA, which is a noble thing to do, however, you're basically now defining what's reasonable by signing up off on the design. So then how does that relieve the responsibility down the road in the operations portion to continue to look at ALARA if you already signed off that you've met it through your design?

So that may be a complicated question, but I guess my point is the subjectivity of it is going to always be a point of contention whether you're in inspection program oversight, otherwise even in performance indicators. But it'll be another point during design reviews if you don't have it -- or if you do have it in the rule like it is here. So, you know, we'll just have to face that, I guess --

MR. RECKLEY: Right.

MEMBER HALNON: -- moving forward.

MR. RECKLEY: And again, one of the ways we were trying to do that is to say ALARA is one of those things that you accomplish not just by design or not just by programs but by the combination of them.

And so this language in the guidance was trying to increase everyone's acknowledgment that we're looking at the design and operations and even in operations, a fix to ALARA could include the design or consideration of the design.

And so yes, I agree with you. That was the concern. That's why we're trying to point out here in the green, that that's what we heard form industry was the concern. We're trying to do it through this guidance as well as the discussions we're having as part of the rulemaking.

CHAIRMAN BLEY: In response to what Greg said, if I were submitting an application for a construction permit or an older license, I suppose I could lay out my plan for how I coordinate design aspects with future operations to meet the goals you're trying to put into the rule here; is that right?

MR. RECKLEY: Right. And that's the way it was traditionally done that the performance goals that were in Appendix I and used as goals -- they weren't as stringent a requirement as some of the others in Part 50 -- but those goals were then reflected in 50.36(a), the environmental tech specs, and action would be taken if those performance metrics weren't being met. And so that's all we're trying to do here as well is tie the operations, say the design contributes ultimately to keeping doses to the public as low as reasonably achievable but trying to acknowledge that it's the combination of the program, the maintenance of the program, the maintenance of the equipment as well as the original design that all contributes to that. And one way to do it would be to say at the design stage, we are setting -- we can meet the following performance goal. And I'll just make a number up and say -- let's say it's 3 millirems a year, all right, some low number. And we will be able to do that through our design and we're putting the monitoring equipment in the right places to make sure it's maintained. The staff should be able to say 3 millirems is a reasonable performance goal, and we can tell whether they were effective in their design because it's going to be monitored and look less at the design and convincing ourselves that they can meet that 3 millirem number. So that's really kind of what we're trying to do here.

MEMBER HALNON: Yes. One of the things I'm looking forward to is how it translates through the licensing documents and to either licensing conditions -- license conditions or tech specs or some other way that we couple up things, then --

MR. RECKLEY: Right.

MEMBER HALNON: -- we'll have a design based on operations. You're going to have to have some hook in there to --

MR. RECKLEY: Right.

MEMBER HALNON: -- the inspectors, the oversight, something to look at.

MR. RECKLEY: And again, it's not totally unlike what we have in 50.36(a) now --

MEMBER HALNON: Right.

MR. RECKLEY: -- so. Okay. So that's the iteration on ALARA. Basically, we're proposing to keep it but we're trying to say that the guidance should help alleviate some of the concerns about ALARA at the design stage.

Slide 30 goes to the second feedback that we got on the second tier, and that's the use of the QHOs. I talked about this already. Some concerns --

MEMBER BROWN: Bill?

MR. RECKLEY: Yes, Charlie.

MEMBER BROWN: Can you back up just a second?

MR. RECKLEY: Yes.

MEMBER BROWN: Since I come from the

nuclear program, I want to get a better -- a little -- I've listened to Greg's comments and Dennis's -- a little better understanding when I talk -- when I think of the ALARA relative to design. And I guess my perception is during the design of the plant, you have some design basis that you would like to achieve in terms of operators, maintenance people wandering around maintaining various pieces of equipment, and their closeness or non-closeness to the reactor plant itself, and so you don't want them to achieve dose limits or doses that are too high over the period of whatever they are, a year or what have you.

But I mean once you've done that monitoring programs, if they detect that you're not meeting those, you have to have a better -- bigger exclusion zone for people to wander around doing work or control it more via programs. Is that -- that's from an internal operations standpoint.

I mean the ones at the boundary questions of 25 rem, etcetera, and all that type of stuff of the site, those are fixed for the emergency conditions, but the ALARA, seems to me, is largely based on operations and maintenance and making sure your staff is not over-exposed. And that's a battle that you go through to try to make sure you can maintain stuff but not exceed some limit. You said 3 millirem, and I don't know where you pulled that number out of.

MR. RECKLEY: But this particular one is public ALARA. We'll get to worker protections --

MEMBER BROWN: Okay.

MR. RECKLEY: -- in a minute.

MEMBER KIRCHNER: This would include normal effluents, right, Bill?

MR. RECKLEY: Yes.

MEMBER BROWN: Yes. So that's a design issue really and then one that you monitor downstream during operations.

MR. RECKLEY: And traditionally, this looks -- for large light-water reactors, this traditionally looks at things like waste gas systems, because --

MEMBER BROWN: Exactly, yes.

MR. RECKLEY: -- by and large, the bulk of the radioactive material is confined and concentrated in the core. Then you have -- so -- but as you get to some of these other designs, it may differ somewhat in terms of how the radionuclides are distributed through the plant. So yes, we will get to occupational in a second, Charlie, but the same -- a lot of the same basic argument holds, although the -- to my knowledge, the NRC hasn't had performance goals equivalent to Appendix I for the occupational dose at the design stage, but certainly when we look at a design -- I'll just make something silly up -- if you had a pipe that contained radio -- concentrations of radionuclides going through an area where people were, that was going to show up a red flag that hey, why are you doing this, what shielding are you going to provide, or can't you redirect that pipe, right? I mean that's, I hate to say, too much, but it's kind of common sense, right, of the need to address occupational dose. And designers do it. I don't want to imply they don't do it, but when we get to the -- down to the occupational, protection of plant workers, we also kept ALARA. So it's somewhat the same comment, although we haven't traditionally had the performance goals that we have for external effluents.

MEMBER BROWN: Okay. Thanks, Bill.

MR. RECKLEY: Okay. Slide 30 is the feedback we got, again, on the second tier still, but related primarily to the use of the QHOs. And again, some stakeholders, we had a mix. Some were comfortable with, even promoting, the use of the QHOs as a metric, but others not wanting to use the QHOs because they have not previously been actually incorporated into technical requirements.

Some concern over the use of QHOs goes to Dave's earlier question that in order to show you meet them, you need to use a tool like the PRA, because you need to quantify the results in order to compare them to the QHOs. So those who didn't want to do a PRA also didn't want to use the QHOs because it's basically the same comment. Some did propose some alternative to the QHO either in language or in approach.

Our iteration, as you'll see, is that we maintain the use of the QHO. Although they haven't been explicitly in the regulations before, they are very well-established in terms of their use for decisions and licensing, be it Reg. Guide 1174, be it the consideration of regulatory treatment of non-safety systems, a finding in accordance with Chapter 19 of the SRP for plants under Part 52, and back-fit assessments and so forth. So they are a widely-used tool, a well-established measure, and so we use that in our thinking to keep it.

And the second note, if -- the concern that if you go more vague in terms of a metric, it's hard then to have what we'll talk about -- what we talked about earlier and also when we talk about the other Subparts, a common thread that goes all the way across. And so for example, in operations, when we get into the reliability assurance programs for non-safety-related equipment, how would you use or how would you define those reliability targets if you weren't using a tool like PRA and didn't have a defined metric like the QHOs.

And so if you onto 31, you can see what we did for the second tier in the underlined text there. You can see basically for unplanned events, we keep the QHOs. For the normal operations, we keep ALARA, as I mentioned, but we did take out -- we had put in the Appendix I working as a placeholder. We took it out and say we're going to do an alignment with Part 20 discussions of ALARA and also the need to meet the EPA regulations in Title 40 Part 190 that defines design goals for nuclear reactors. So that's the proposed second iteration of the second tier.

Go on to slide 32. I think I've gone over this. We maintain ALARA. It's a longstanding element. It's applicable to every other NRC licensee. We maintain the QHOs in the second interaction because it's, again, we think is -- it's a well-established policy. It's a well-established metric to use in risk-informed decision-making.

MEMBER KIRCHNER: Bill, this is Walt. Is there -- are you using a surrogate there in addition to the frequency of a dose in your -- in implementing the QHO?

MR. RECKLEY: No. What the language that we use is basically the immediate health effects or prompt fatalities below 5 and 10 million, which is the QHO right out of the policy statement --

MEMBER KIRCHNER: Right.

MR. RECKLEY: -- and for latent health effects, below 2 and a million, which again is the number right out of the safety goal policy statement. So we are putting it in terms of the health effects and not in terms of dose, if that was the question.

MEMBER KIRCHNER: Yes, that was because don't you need a surrogate? Don't you need to define what's immediate and latent? And that implies a dose.

MR. RECKLEY: Yes. All this is dose-related and we would, as we go forward -- you know, again, these numbers have existed for a long time. They're the numbers in the safety goal. The use of those numbers and how they're reflected in large light-water reactors and level three PRAs, that conversation has been made in codes like MAX. You're going to go beyond my level of expertise.

And so one of the questions that we have had is whether this would be better put in terms of doses. Our thinking is that it-- because there's a probabilistic element, it's not a dose, right? It's a distribution. And we think the guidance can fill that gap and define how you meet these metrics, and the use of established models in the existing PRA methodologies, we think, would be an example. But we're open to people saying we might need additional guidance in this area.

MEMBER KIRCHNER: Bill, I just think it would be simpler for you, the staff, and simpler for the applicants to have a little more guidance, you know, a certainty as to what's the definition of "immediate" and "latent" in terms -- and that -- I think in addition to the PRA aspect, the frequency aspect, at some point, you've got to have an agreement about how much exposure actually is needed to meet either or. You see where I'm coming from? And that would provide --

MR. RECKLEY: Yes.

MEMBER KIRCHNER: -- more certainty.

MR. RECKLEY: And this is -- you know, we've talked internally. When we started out in the rulemaking plan and in the licensing modernization

SECY paper where we said we were going to use that as we move forward into this rulemaking, what you're suggesting is largely provided, for example, in the frequency consequence curve with then a secondary check or confirmatory check to show that you meet the cumulative goals of the QHOs. But in response to a general observation that we didn't want to or some stakeholders didn't want us to, paraphrase, codify the licensing modernization project, we tried to provide the words here such that NEI 1804 and Reg. Guide 1.233 would be one acceptable way to do this. And so 1.233 and NEI 1804 has the frequency consequence curve that would do what you --

MEMBER KIRCHNER: Yes.

MR. RECKLEY: -- are suggesting. But in our attempt not to codify it, we tried to leave it open for other approaches. And so that's one of the reasons that we'd done -- you know, there are some stakeholders that say you -- we should put the frequency consequence curve from LMP into the rule and it would be more clear. And, you know, we -- that's one comment. And then others who say they don't want it to be used at all. So we're trying to walk the muddy middle and --

MEMBER KIRCHNER: Yes. I appreciate your

challenge. I was just thinking that taking that next step might make for a little more certainty and predictability in the actual implementation of the rule from both sides, both the staff and the applicants.

MEMBER KIRCHNER: Yes. So I think those using NEI 1804 will have -- we're trying to make sure that it stays as an acceptable way, and so as we craft it, we're trying to make sure that that does fit. There are some tweaks that people have shown we may need to make just to make sure there's not a disconnect. But by and large, we think we can -- that that's one acceptable way to do this, and we're going to try to make sure that remains. And then -- so in that methodology, it would be fairly clear-cut. In others, either the staff or some other party may come up with alterative guidance on how to meet this, but we'll see. So that's one of the reasons why it's not maybe as clear as it would be if we just, for example, used the frequency consequence curve from NEI 1804. Charlie, I think you had a --

MEMBER BROWN: Yes. It's -- I was reading your discussion paragraph and you talked about unplanned events, and you -- and definitely the numbers 5 and 10 million and 2 and 1 million are in, I guess, (b)(2), but you never used the words "those are the objectives from the QHOs." QHO doesn't exist in the document. I didn't see --

MR. RECKLEY: Right.

MEMBER BROWN: -- words anywhere; is that correct? Am I --

MR. RECKLEY: Yes. We took the numbers but we didn't cite the safety goal policy statement as the source of the numbers. You're right.

MEMBER BROWN: Is there a reason for that as opposed to just tossing the numbers in? I guess I would have said, hey, we're using the QHOs, the following QHOs, blah, blah, blah, and that way it covers the source, but you didn't and I guess you had a reason.

MR. RECKLEY: I mean we always said in the discussions that's where they were coming from. We didn't cite it in the rule language itself.

MEMBER BROWN: I got --

MR. RECKLEY: So it's a good --

MEMBER BROWN: Yes. I got that --

MR. RECKLEY: -- it's a good observation. You know, that's another thing we'll take back and say would it be more clear to say even within the rule where they came from.

MEMBER BROWN: Yes. And it doesn't have to be extensive, just that --

MR. RECKLEY: Oh, no.

MEMBER BROWN: -- they're below the QHO limits of 5 and --

MR. RECKLEY: Right.

MEMBER BROWN: -- such and such and 2 and whatever and that's it. You don't need anymore.

MR. RECKLEY: Right -- right.

MEMBER BROWN: That's just the thought process. Okay. Thank you.

MR. RECKLEY: Sure. Okay. If we can go to 33, the -- this goes to some of the discussion -- and we'll continue this in Subpart C on design and analysis, but -- so the safety functions -- and we talked about this in terms of the GDC kind of comments -- was the first iteration we laid out that the primary safety functions, the retention of radionuclides, and put in the requirement that any designer or applicant needed to identify what other safety functions were needed and gave the example of heat generation or reactivity, heat removal, chemical interactions, and then set design features and programmatic --

MEMBER BROWN: (audio interference) --

MR. RECKLEY: -- controls needed to be put in place to fulfill that, those safety functions. So again, we got some comments, including from ACRS members, to cite the fundamental safety functions. If we go to 34, you can see what we ended up doing, which is to maintain A and B basically the same and then to try to clarify that the primary and additional safety functions required to meet the first and second tier are fulfilled by the design features and programmatic controls.

Then when we get into Section C on design, you'll see the connection to the design features. Part of the rationale for doing it this way was to -- a couple of them are that when you're looking at some advanced reactor designs, the inventories of radionuclides are somewhat different and significant inventories can be outside of the primary system. And so the safety functions associated with those inventories might be different, and I gave earlier the example you may not need a reactivity control in a waste gas system. But they would need to define safety functions for those systems.

Then the other one is in our communications with the Commission, we extended technology inclusiveness all the way to saying we would develop Part 53 as much as we can to even accommodate fusion energy systems, because fusion reactors were included in NEIMA as an example of an advanced nuclear reactor. And so we decided in the second iteration to keep it more or less the same and clarify that when we get to the next section, Subpart C, the design features, you should see how this carries through.

And so one of the discussions -- and maybe if I can ask to hold off that -- one of the questions -- Liz, can we go all the way back up to slide 7?

One of the questions would be to, as we go forward in the discussions, of how this basically can equate to making sure we didn't lose anything that's provided by the GDC.

And so going to Charlie's point about, for example, within I&C, the independence and the separation of protection and control and things like that, of trying to decide where in this hierarchy the most appropriate place for that kind of additional requirement might be. And what I'm going to suggest is in my opinion, it's the last chevron, functional design criteria, and we can talk about it when we get to that point, which will be right after lunch when we're talking about Subpart C on design. But we can come back to this slide and if there's a general discussion that it should be, let's say, under safety functions, that's a little harder for the reasons I just said, that we're trying to make it not only technology-inclusive but also to make sure that the requirement addresses all the inventories and not just the reactor system.

So sorry, Liz. Now can I get you to go all the way back down to where we were? So you'll see that's the only change we really made to the safety functions requirement under Subpart B.

MEMBER KIRCHNER: Bill, this is Walt. I like what you're doing but I would just say -- this is just one member -- I object. I don't think you've defined the safety functions properly. Controlling heat generation, heat removal, and chemical interactions, yes, that's a design -- in your terminology, what would that be, a design -- what's the third chevron? I'll look at my notes. A design --

MR. RECKLEY: Design --

MEMBER KIRCHNER: But for me, the safety functions are -- and the one that's absent that just disturbs me greatly is maintain control of reactivity and the capability to shut down the reactor and put it in a safe, stable condition. To me, that's primary. That's the primary safety function.

The second one is to maintain control of the integrity of the as designed configuration of the plant's fuel and radionuclide inventories. So that's second.

And then third fits in with your overall objective, which is not A in the -- and so the order to me is not so important. But I don't think this gets at the essential safety functions. B looks too much like design detail. And leaving reactivity control and the capability to safely shut down the reactor, I just think that's a glaring omission. And again, this is just one member's opinion.

MEMBER BROWN: I agree with you, Walt.

MEMBER REMPE: So this is Joy. I guess I'm not so offended by putting controlling the release of -- or limiting the release of radioactive materials as the primary, but I do strongly support that you need to add control reactivity under Item B. Since you've listed these other ones and there's so much in the regulations today that include controlling reactivity, I don't understand why that was omitted in Item B.

MEMBER PETTI: Well -- this is Dave. I

interpreted controlling heat generation as controlling reactivity.

MEMBER REMPE: Well, we've had a plant that could continue going for a long period of time still critical. I think that we need -- you know, yes, that's often the excuse given, but I think that because we're talking about shipping plants that have run to another place to remove the follow-up el and a lot of things like that, I think I would control reactivity as a function that needs to be thought about.

MEMBER HALNON: Yes. I agree because there have been transients that prior to the point of adding heat that you can argue had nothing to do with heat generation but certainly had a lot of reactivity implications.

MEMBER KIRCHNER: Yes. For example, you have so much excess reactivity at beginning of life in some of these designs that you may not even have any decay heat removal issues, but you could have a reactivity insertion accident that could just be a threat to the general public and to that primary safety function of limiting release of radioactive materials.

MR. RECKLEY: Good comment and I think we can put it in. To be honest, it was not so much a conscious decision to exclude as it was, as Dave suggested, that it was considered within the controlling heat generation. But certainly, I think we'll take this observation and putting reactivity within additional safety functions to be considered, I don't think anyone would take issue with it, to be honest. And we didn't -- I'd just ask not to over read that it's not there, because we were thinking it was under controlling heat generation, as Dave said. But if -- but -- so point taken and certainly something for us to do on the third iteration.

MEMBER KIRCHNER: But Bill, at risk of belaboring my point, let me pick on one of these in B, chemical interactions. Certainly, that's a design consideration, something that needs to be controlled, but that's not primary. What's primary is to maintain that, whatever the design is, is to maintain the integrity of the boundary that contains the fuel and the radionuclide inventory. And I pick my words carefully because yes, as you point out, there can be designs where they're stripping fission gasses or products or both. And then they're relocating those in some storage vessel or something, so the integrity of that boundary obviously needs to be protected as well. But that's the primary safety function, and the heat removal and the chemical interactions, these are design -- kind of design details, in my opinion.

MR. RECKLEY: Yes. I think there's probably more agreement than disagreement with what we're trying to do. Liz, I'll ask you to jump around. Can you go to 77?

So in agreeing with what you're saying, when we looked -- or I'll use first person -- when I look at it, the first function that we identify is the retention of radionuclides, which you do by having the barriers in place just like you said. And then in my mind, the supporting safety functions, the reactivity, heat generation, heat removal, even chemical interactions are those supporting safety functions you need to maintain the barriers. And yes, in our terminology, we're calling those safety functions, but they are tied directly to, in any particular design, maintaining the barriers that you see in this figure, which are the barriers sued for the primary objective of the retention of radionuclides. So I think we're in general agreement, whether you call those -- the exact terminology, how you want to phrase it, but we would call those "the other safety functions" but agree with 100 percent they're safety functions because they're needed to maintain the barriers needed for the first function, the primary function, which is the retention of radionuclides. So --

CHAIRMAN BLEY: I want to jump in just a second. As we try to help you rewrite this thing on the fly, we need to be careful because -- and I'm just going to pick on Walt, so the chemical stuff isn't important here -- if something happens to one of these others, it can blow apart what you're counting on and what you think is the primary safety function. So I like -- I think many of us like this figure you've used here --

MR. RECKLEY: Yes.

MEMBER KIRCHNER: Dennis, I like this figure. That's where I would start from as well. I didn't mean to diminish chemical attack of barriers or anything, but this figure, I think, is very good, very -- I would lead from this figure actually.

MR. RECKLEY: Yes. So anyway, Liz, if you can go back. So --

MEMBER PETTI: Let me just -- Bill --

MR. RECKLEY: You go --

MEMBER PETTI: -- from a technology perspective, I think we all agree that the roles of the barriers are very different in different technologies. The chemical interaction issue is huge in a sodium fast reactor. You got to have integrity of that boundary or else you're going to have a sodium fire. In a gas reactor, it really doesn't matter too much if you lose the reactive coolant boundary, if you will. In a salt system, it doesn't really matter except for the gasses because other fission products are in the salt.

And so I actually liked what was there, because I thought it just tied better to a more technology-inclusive approach; whereas if we start talking about barriers, how this gets implemented will be very different across the advanced reactor spectrum.

CHAIRMAN BLEY: It's not just across reactor types. It's actually across the accidents that can occur within a reactor type. Those barriers are conditional on what the challenges are.

MR. RECKLEY: Yes.

CHAIRMAN BLEY: That's a great figure if you can get the idea of this organization, well, across, that's (audio interference).

MR. RECKLEY: Okay. So Liz, sorry. If we can go back? So again, it is -- I -- that's why I said I think there's more agreement than disagreement.

It's maybe just how it's worded, and we were thinking, again, to that figure.

And so if we can go on then to 35, the licensing basis events, this was the first iteration, and it didn't change very much. So we can just go on to the slide 36, that we tried to be a little more specific in the language and saying that they needed to cover basically a spectrum of events from anticipated operational occurrences to very unlikely event sequences. But the underlying thought, the underlying requirement remained the same. We didn't really have a change of thought. We just thought that there was maybe some clarifying language by basically reinforcing that the licensing basis events are the spectrum in SECY 19.117. We called it the spectrum from benign to severe, and that's what we wanted to reinforce, that it's the whole range that need to be considered within the licensing basis events.

MEMBER MARCH-LEUBA: Yes. The problem I have with this is that for light-water reactors, we know the spectrum quite well. We have 50 years of experience. For some of these new crazy advanced super safe reactors, I don't think we have that experience to know what can possibly happen. So it has to be emphasized that this is not a minor step on the design. This has to be a significant effort to try to figure out exactly everything that will happen.

MR. RECKLEY: Yes. I hope there's no disagreement with that. The nature of the licensing of any plant, the unplanned events are critical to the design, and they're fundamental to the licensing process. And so to do that, you need to try to develop the understanding and that's why when we get down, we'll talk about systematic approaches to try to make sure that everything is identified.

MEMBER PETTI: Well, what's happening -- and you see it on body language -- is if it's not done for light-water reactors, it doesn't need to be done for my plant either. I'll leave it in there but it --

CHAIRMAN BLEY: I'd turn that one around Jose. And Bill, I look forward to when you get to the systematic discussion, but two things that concern some of us here, and the first is you often see people start with this set for light-water reactors and just start striking lines through the things that don't apply to them rather than starting from scratch and saying what are the things that can happen in my design.

And the other part that bothers me is I don't know anywhere in conventional guidance or in the

PRA guidance, including the LMP stuff, that really tells people how to do a search from scratch to find these things. And, you know, we're embedded in history and it came about by a bunch of people sitting around who knew their designs dreaming up what could go wrong, and we're living with a list that were dreamed up and a few things that have happened since then that have added to it. And we need a structured way to dream these up, and if you've got that worked out, I look forward to seeing it. What section will that be in?

MR. RECKLEY: The next section, Subpart -- well, as soon as we get into Subpart C, which is the next Subpart. We got a couple more slides on Subpart B, but they're areas, to be honest, we didn't change very much. I just wanted to go through. So this is the licensing basis event.

MEMBER PETTI: So Bill --

MR. RECKLEY: Yes?

MEMBER PETTI: Bill, just a question on the -- now, I, kind of, like the idea of not putting numerical values to what is a very unlikely event sequence.

But, is there not an inconsistency with, with going with these more qualitative terms, here, but then having the QHOs with, and, and some of the numerical criteria, elsewhere?

Or, is it, you're just going to handle, what you mean, by very unlikely event sequence, in some guidance, so they know, so everyone's using the same cutoff?

MR. RECKLEY: Well, at -- and, again, for keeping in mind that we've already, kind of, decided that that NAI 1804 is an acceptable way to do this, we would, we would say, very unlikely event sequences are within, or, or for the guidance that would equate to the LMP, beyond assigned basis events and the frequency range, between ten and a minus four, and five times ten and a minus seven.

So we, we, as an Agency, have already felt comfortable with that, with all the caveats that that includes, the need to, to address uncertainties and to look for cliff edge effects and some things like that, but, but, basically, we're accepting that, as the very unlikely event frequency.

But, again, we left open, by just using the words that, if somebody wants to make another proposal that they can do so.

And there have been other proposals in, in past practice and, and the treatment of, for example, frequencies below ten to the minus six all the way down to ten to minus eight, as a different category of events and treating them differently.

So we were trying to leave it open, but, at the same time, you know, for those of us most familiar with LMP that that would be one way to accommodate this category.

So if we can go to 37 that's defense in depth. Again, the first iteration had the language here on the slide, the feedback that we got, some, again, mixed -- everything was mixed feedback.

But, some stakeholders did not want defense in depth incorporated into Subpart B, preferring, instead that it would be a philosophy, sort of, as it was done in Part 50 and 52.

There was some issue taken with the last sentence, in particular, no single design, or operational feature, no matter how robust, should be exclusively relied upon. Some thought that was too stringent, too prescriptive.

And, between the staff and stakeholders, and I even brought up, I think, in the last couple of meetings with this Subcommittee, some consideration of whether we needed to distinguish between passive engineered features, something that we'd use, for example, natural circulation and an inherent characteristic that is based on the laws of physics and not an engineered barrier.

So that thinking went into the change we made, if we go to slide 38, which is -- the primary change we made, this is some editorial changes, but the primary change was to change that one sentence and say, no single engineered design feature of human action or programmatic control, no matter how robust.

And the reason for that was to consider the possibility that, if an inherent feature is credited that, that that may not warrant having a backup, because it's based on a law of physics.

And, therefore, there should be no uncertainty associated with its behavior and, therefore, you wouldn't need to have defense in depth, as a, as a measure to, basically, support the failure of the law of physics.

That -- so we changed the language. I don't want to oversimplify how that, you know, an inherent feature is provided by having a very good understanding of what you have in place and its behavior.

So that may not -- that that's going to be a challenge. But, to the degree you can say it's based on the law of physics that's, that's the reason for the change.

Otherwise, we are proposing to keep it, as a requirement, in Subpart B, and have it considered, as one of the higher-level requirements that will carry through all to the other subparts.

So I think, with that --

MEMBER REMPE: So this is Joy. And, again, I'm just trying to kick the wheels of the car, or the tires of the car. I -- I'm just wondering, if an inherent feature could be disabled, because of a size, a large, beyond design basis, seismic event, where, for example, the configuration of the core were damaged, or -- is, is that -- I, I know this is a discussion about passive versus inherent and that inherent was given more credibility, but is there -- I don't have a good example to give you, really, but is there a way that an inherent feature could be disabled?

MR. RECKLEY: I, I, I would -- I would tend to argue, if you can disable it, you may not want to call it an inherent feature. And so let's take your example and say, I have conduction of heat and I want to say that's an inherent feature.

But, if the, if the heat path can be

disrupted, it, at least, would not be an inherent feature, from a seismic event, if that's the event that can cause it to be separated, as a heath path. Maybe, it's an inherent feature for some other transient, but not for the seismic event.

Likewise, if I'm going to say that heath path and the, and the behavior of steel is, is, and the conduction of heat and steel, I'm going to have to make sure that the steel is what I think it is, that the steel doesn't change, over time, as a function of, of its environment and all of that.

That's why I, I think we're open to discuss more use of inherent features, but, but there's a lot of questions on the use and the assurances that, what is treated, as inherent, truly is inherent that that it can't be interrupted, and if it can, then it would be better to be treated, as an engineered feature.

MEMBER REMPE: Okay. I'll think about it some more. Again, I'm thinking about reactors flying through the sky to be transported to and from sites. And so just thinking about ways that that assumption could be contradicted. But, anyway, go ahead.

MR. RECKLEY: Okay. And, again, as we looked at, you know, one of the things, one of the things that we were thinking about is, and we had brought up to the Subcommittee and to the stakeholders is, is whether, the use of something like unmitigated consequence assessments can be used and, and that might be a place, where an inherent feature, because that language is used in the seismic design standard ANS 2.26.

And so that's when we started to explore that, a little bit. And, actually, the way that's used, within the DOE complex, it's more event-specific.

So maybe, that's why I was saying, it might get, as complicated, as to say it's inherent for one accident, but not inherent for another accident. So -- but, we haven't had much discussion with stakeholders, or individual designers, about trying to use that distinction, at this point. So the last slide --

MEMBER BROWN: Bill.

MR. RECKLEY: Yes? Charlie.

MEMBER BROWN: I want to go back to 38?

MR. RECKLEY: Okay.

MEMBER BROWN: I'm a defense in depth guy, as you've probably listened to me, many times. And what -- as I read this, the last sentence, which says, no single engineered design feature, no matter how robust, should be exclusive, or ride on, and that's last.

As opposed to that, we go through uncertainties and all this other hand waving. And, you can deal with uncertainties, all you want to, but the critical feature of defense in depth is more than one and that's not emphasized that way, in this paragraph. That's my personal opinion.

MR. RECKLEY: Just --

MEMBER BROWN: I --

MR. RECKLEY: -- just --

MEMBER BROWN: I would invert --

MR. RECKLEY: -- just --

MEMBER BROWN: -- all that.

MEMBER BROWN: Oh, okay, and have that be the first sentence?

(Simultaneous speaking.)

MEMBER BROWN: Yes. We ought to talk about no single thing. That's -- you want multiple systems, instead of backups. And all the rest is just details underneath how you come up with what those systems may require.

MR. RECKLEY: Okay.

MEMBER BROWN: That's -- I mean, but

that's my thought.

MR. RECKLEY: Okay. Noted.

MEMBER BROWN: Thank you.

MR. RECKLEY: Okay, if we can go, then, to 39. This, we had talked about, the production of plant workers. Again, this is an area we got the same general comment that, some stakeholders, thought we shouldn't include this in Subpart B, and, and also, the ALARA provisions, some people thought we shouldn't have.

If you go on to the next one, in the second iteration, you can see, here, this is an example, you can see, in the language, where we -- Dennis, you brought up, we point to Part 20, as opposed to paraphrasing.

And -- but, technically, we kept it, basically, the same that, that, that you need to have design features, to keep dose to plant workers below the limits, in Part 20, the firm limits, like the five rem, per year, number.

And then, also, the second, Paragraph B, that it should be kept, as low, as reasonably achievable, but we just changed the wording to part, to point to Part 20.

And then, the note, at the bottom, just a, I guess, a continuing reinforcement of, why we think ALARA is important is, is it's not only a longstanding practice of the Atomic Energy Commission and the NRC, to include it in our requirements, it's also recommended, by the EPA and their federal guidance for radiation protection. So 41, so that's the, the discussion and --

CHAIRMAN BLEY: And this ends the second major of --

MR. RECKLEY: Yes.

CHAIRMAN BLEY: -- it, for almost equal 20 slide sections, so I think this is a good point, to break for lunch. It's a little early, for those of us, out West, but it's a good stop --

MEMBER BIER: Dennis?

CHAIRMAN BLEY: Yes?

MEMBER BIER: I have a couple of questions that are relevant to this morning's discussion, so maybe, we should take those quickly, now?

CHAIRMAN BLEY: We can take them, now, and if other Members have some questions, we can do those before we break for lunch, as well.

MEMBER BIER: Super. First, I will apologize, because I'm a newbie, so there may be terminology that other people understand differently than I do.

The two questions that I have, one of them pertains to the safety goals, our quantitative health objectives, and it -- I used to have them memorized, but I don't anymore.

But, it occurs to me that, some of the language in those, like, you know, no greater than .1 percent of whatever, may be, kind of, assuming a certain range of reactor size.

And so I don't know, whether it's relevant to Part 53, or relevant to, you know, the revision of the safety goals, themselves, or whatever, but it occurs to me that, if you have small modular reactors, with large numbers of reactors, at a given site, somebody should look at, does the safety goal apply to each individual reactor, in which case the site, as a whole, could potentially pose a large risk, so has anybody looked at that?

MR. RECKLEY: Yes -- in terms of our Part 53 effort, it's been looked at, in terms of, the operating fleet and, even, Part 50s and 52, through even policy papers, as to whether it applies to single units.

And then, out of Fukushima, there was a discussion and a look to see multi units and, and decisions were made.

Within Part 53, we're more clear that, this -- all of the criteria are being applied to the plant, where the plant includes every reactor unit, or module, and every major radioactive inventory, be it waste gas, spent fuel storage, or whatever.

MEMBER BIER: Okay. Thinking a little bit speculatively, kind of, similar to some of the questions Joy raised. Could you imagine a site where, you know, you have 40 reactors, but technically, each one is owned by a different company and claims to be a unique facility, or whatever.

MR. RECKLEY: I think we would -- during the next generation nuclear plant, some of those questions came up. And so I think, if they're at a -- that that's an area, where if, if multiple licensees, multiple nuclear, advanced nuclear plants, meaning, multiple modules, multiple sources.

But, different licensees are at the same site, we would have to take that under consideration. But, the Rule doesn't, specifically, address how that -- how we would do that.

MEMBER BIER: The other thing I wanted to come back to is, similar concerns to what Greg raised, about the terminology of no immediate threat. And, again, I apologize, if this has, you know, kind of, an understood meaning, within the jargon.

But, to me, if I say that, the plant is responsible, or the licensee is responsible for ensuring that no immediate threat can ever occur, then, to me, there's no room for any other cost benefit risk reduction, because any future threat will, at some point, be an immediate threat.

So if they don't prevent future immediate threats, then they violate the immediate threat part of it. And -- so to me, the language just seems, again, a little bit odd.

And, I can understand, for instance, if it's no immediate threat, during normal operation, or something like that, but, you know, any off-normal occurrence would, at some point, in the future, pose an immediate threat, it seems to me. So again, I apologize, if that's off topic, but I just wanted to raise it, quickly.

MR. RECKLEY: Okay. Again, in our, in our logic, we're equating immediate threat to the 25-rem over two hours, at the exclusionary boundary, or 25-rem, over the course of the event, at the low population zone boundary. And that would be, primarily, done through the assessment of the design bases accident. And then --

MEMBER BIER: Okay.

(Simultaneous speaking.)

MR. RECKLEY: And then, when we get into operations, basically, we would be showing that, the way the licensee meets that, is to make sure all the equipment that's needed, basically, all the safety-related equipment is always available to deal with that transit.

MEMBER BIER: Yes. So I guess, maybe, what I was missing was the design basis part of it that, I don't know, I --

(Simultaneous speaking.)

MEMBER BIER: -- would have to go back and look at the slide, again, I don't think it's worth going back right now, but make sure that, no immediate threat is tied, clearly, to design basis.

(Simultaneous speaking.)

MR. RECKLEY: Okay. We'll look. Thank you.

MEMBER BIER: Okay. Sure thing.

MEMBER HALNON: So, Bill, have you reached a debate on, whether or not, you're going to license individual modules, or reactors, versus the entire site, have you reached that debate, yet?

MR. RECKLEY: I mean, the standing thought is that, every reactor unit will have a license, or a docket and, just like we do, now, Palo Verde 123, each has a license, but it's a, it's a plant.

So the difference here is, although, every module will have a license, the safety analysis will be done for the plant and, and this is, I think, the same as we had proposed under the next generation nuclear plant and the general NAI 1804, or before that, the MHGTR-type-of-analysis methodology.

MEMBER HALNON: Okay. So down the road, if you have multiple licensees then that'll be in discussion, like you mentioned, down the road?

MR. RECKLEY: Yes, and we can handle that, as long as they're part of the same plant.

MEMBER HALNON: Right, understanding.

MR. RECKLEY: But, if you had multiple plants, at a site, I -- that's an area we haven't, we haven't thought of.

MEMBER HALNON: Okay. Yes. That's a --

CHAIRMAN BLEY: It's one you probably might consider, because that happened --

MR. RECKLEY: Okay.

CHAIRMAN BLEY: -- in other parts of the world.

MR. RECKLEY: Yes.

CHAIRMAN BLEY: Vesna would like to get in here. Vesna, please.

MEMBER DIMITRIJEVIC: Yes. I was saving this, to make a comment, to understand, when we have a discussion, but since we are discussing this part, I'd like to make a comment on the using the content at the health objective.

Because, in this discussion, we say that they are well-established and used all the time and I always had that in me, strong opinion that, particularly health objectives, have not been well-established, even in the current regulation, which is a well-established -- is how we use substitute measures, you know, like, core damage frequency and large early release frequency to reference then, what was the tenth of the core objective health objectives.

Basically, if we go back to that, how this -- and this is what I was checking, so I can contribute, you know, by checking how the connections were made.

When we went -- when we started the original quantitative health objectives, there was a capital object -- our assumptions, which were made, which are crucial for this, one of those that, in which, you know, Barjo (phonetic) said they don't have a good basis for it.

One of the assumptions for example, if you look in the Latin and Contra (phonetic) facilities is that, condition approvability of the Latin facility, given the false accident is four to E minus 3. There's absolutely no basis for that number, and there was some really good basis of connected that could core damage frequency.

So in addition, there was also this point one percent of the connection to the Contra facilities from all other causes, which was done, like, 30 years ago, and who know what that number is, now.

So there is a lot of numbers there, however, the event moved from the -- presenting less than point one percent of the risk of all other causes to dose objectives.

So if we had to establish -- if we're going to use that quantitative health objectives, again, as the goal, we have to deal with the controversy of those numbers. So I will not say that quantitative health objectives are well-established goal. So that's my comment.

MR. RECKLEY: Okay. And I, I understand what you're saying, and, and yes, for the light water reactor fleet, the surrogate measures, core damage frequency, large early release frequency, yes, are more commonly used.

There's -- and you mentioned, I think, there's some derivations available, to show where those numbers came from and I remember, off-hand, there's an appendix to NUREG 1860 that has such a derivation.

As you get into other reaction designs, if they're going to propose a surrogate, then they would have to do such an exercise and show how their approach, basically, meets the health objectives. But --

MEMBER DIMITRIJEVIC: That point would be that, you also face, like, the new definition is that, you're using the same number and so it's couldn't use five in, like, you know, five, ten to minus seven, for the immediate health effect.

But that has to define, you know, what dose results in this immediate health -- they're all the same controversial questions, which come here, in this, and that may not be easy to establish, you know?

Because, if you have a number, like, five and ten to minus seven, what does this number measures? It is supposed to measure immediate health effect.

How do we define this immediate health effect? You know, there is so many and how are they related to the radiation releases?

So this is a -- so I just want to say, if we say we are keeping QHO, because they're well-established measures, then a lot of controversy's connected with QHO, using QHO. That's my comment.

MR. RECKLEY: Okay. Thank you.

CHAIRMAN BLEY: Thanks, Vesna. Any other Members have questions, before we take our lunch break?

(No audible response.)

CHAIRMAN BLEY: No more. We're going to break, now, for lunch, and it's 11 o'clock, no, 12 o'clock, back East, no, it's not, it's 1 o'clock, back East, right?

We'll break for one hour -- well, we'll take a little more than an hour. Come back, on the hour, at 2 o'clock, back East, I guess, it is, yes, 2 o'clock. We are now recessed, until 2.

(Whereupon, the above-entitled matter went off the record at 12:53 p.m. and resumed at 2:01 p.m.)

CHAIRMAN BLEY: Let's bring the meeting back into session. Bill Reckley, if you're ready, please, go ahead.

MR. RECKLEY: Okay. Thank you, Dennis. And, and just in regards to the schedule, we'll probably take this subpart past 3 o'clock, but we don't need as much time, as allotted, for Subpart E, on construction.

So we'll get out on-time, I'm just warning you, Subpart C, might go a little past 3:00 p.m.

CHAIRMAN BLEY: Yes, I would (audio interference) to take longer. We might hope for break, in the middle of that, but, if that seems appropriate.

(Audio interference.)

MR. RECKLEY: Okay. So -- yes. So now, we're going to get into the preliminary proposed language, for Subpart C, for design and analysis. So if we go to Slide 43.

So -- and I'm going to, actually, have Liz pull up the Rule language, here in a second, the table, so we can take a -- look. Because, just in terms of the feedback, we didn't get much feedback and we didn't make many changes to these sections, but they're important to what we were talking about, this morning, so I want to talk about them a little more than just in regards to what we changed, which again, was not very much.

So this -- these are the sections that get into the design and they talk about, when I showed the chevrons this morning that that the safety criteria, then the safety functions.

And then it -- that rolls into Subpart C, with the requirement under 53.400, to identify design features, and then, for those design features, to identify the functional design criteria, to meet, both, the first and the second tier.

And then, under 53.430, we do plant workers. Again, the comments were, largely, if you didn't favor having the requirement in, to address occupational exposures, then you didn't favor keeping in functional design criteria, for that purpose.

And -- and then, lastly, design requirements. So you can go to, to the next slide, Liz. And then, like I said, we didn't really maintain these -- we didn't really -- I'm sorry. We didn't really change these.

But, if you can call up the discussion table, Liz, and go down to, like, Page 8. So this is the actual discussion table that that that we had released, to support the discussions. Yes, one -- yes, this page. And so here, you can see the language that basically says, design features must be provided, such that, when combined with programs and human actions, the plant will satisfy the safety criteria and that the design features provide the safety functions.

And, and that's the safety functions of both, the way we have it characterized, the primary retention of radionuclides and then, the supporting safety functions, as they're identified, by the designer, for the source, for the reactor design and for potential other inventories, to supporting safety functions, such as we talked about, this morning, reactivity, heat generation, heat removal, and, possibly, chemical interactions.

And then, the next section of 53.410, proposes that, going down to Paragraph B, on planned events, keeping the focus on the unplanned events that, functional design criteria must be defined, for each of those design features relied upon to demonstrate compliance with the first year safety criteria.

And then, if you go to the next page, it basically, it says the same thing, for the second tier, the edits were just, we had some repetition, back to Subpart B, so it -- editorial, we took that out.

So if you go down to the bottom of the page, you can see, it's basically the same language, functional design criteria must be defined, for each design feature relied on, to meet the second tier safety considerations and, considering licensing basis events and defense in depth.

So yes, if we go to the next page. And -- so skipping over the functional design criteria, for plant workers. Again that just, basically, lays out that the designer does have a role in the design process, in terms of, occupational exposure.

But then, going down to 53.440, we establish some additional design requirements, such as using generally-recognized consensus codes and standards, making sure you qualify the materials, to their service conditions, consideration of safety and security.

And then, the last Subparagraph D, is the equivalent of what we currently have in 50.43(e) that is, design features have to be shown to work, through accommodations and test programs analysis, if appropriate prototype testing, operating experience, or a combination of those things.

So those are laying out the design aspects, the assignment of design features and then, the functional design criteria. Given the discussion, this morning, I'm even thinking we may beef up, either, the criteria, the functional design criteria sections, or maybe, this design requirement section, just to clarify matters.

Because, for example, fire protection, we do address fire protection, in the analysis sections that we'll be talking about, coming up, but that's a confirmation that the design measures addressed fire.

We thought that covered it, but maybe, there should be, in this design requirement section, fire protections, specifically, mentioned and then, it can be repeated, again, in the analysis section, to say analysis should verify the measures, incorporated into the design for, for fire protection.

That might also go to, I think, maybe, some of Charlie's comments that, this might be an area, where, if you look at the general design criteria and think there are important things that we're not mentioning, this might be a place we could mention.

And so for safety-related design features, if it's appropriate, we could, we could talk about the independence and separation, or something like that, in order to make sure we don't lose anything.

We do have -- within, without getting too philosophical, Part 53, if you look back, decades ago, when the ACRS generated a number of papers and discussions on the difference between a structuralist approach, where design requirements are defined ahead of time, like, design specifications.

And I don't want to overstate it, but -- so design specifications defined, with the thought that, if you meet those design specifications, you're, you have a safe reactor, and that was called the structuralist approach.

And Dennis, or those, who were around, please correct me, if I, if I mess this up too badly. And, again, I don't want to overstate it, there were other analysis and things to make sure that that was true, but generally, you'd laid out the design specs, a designer meets those specs, then you're good to go.

And the other approach that was talked about, was the rationalist approach, as it was called, which, basically, said you go through design iterations and analysis.

And, and it's the analysis and the

determination, through the PRA and other similar tools, that you actually define what is appropriate to put in. So you're actively managing the risk.

You're using risk metrics and you're managing the risk in the process. And so under Part 53, we are moving in that, in that direction. So again, I, I probably messed that up, pretty badly.

But -- but, we are moving more to the approach, where the designer is being asked to, to look at the design, include PRA insights and, and design to the metrics, as opposed to designing to an established standard, where there's a basic assumption, or presumption that, if you meet those standards, you have a safe design. I see somebody's hand up, let me --

MEMBER BALLINGER: Yes, this is -- this is Ron Ballinger. I'm looking at that Part D, and there's a, kind of, a subtly there that, I guess, I don't -- maybe, it's a different context.

But, you've eliminated, must be, through analysis, consistent with 53.450, dah-dah-dah, and in the replacement, analysis is not mentioned.

MR. RECKLEY: That -- if, if that's true that's a mistake in the editing.

MEMBER BALLINGER: Okay.

MR. RECKLEY: I'm sorry --

MEMBER BALLINGER: All right, well --

MR. RECKLEY: -- sorry --

MEMBER BALLINGER: -- it's, it's not a -- it's a -- for me, it's a not-so-subtle --

MR. RECKLEY: No, it -- yes, analysis has to be, has to be a part of that thing. I -- I'll -- I didn't notice that, when I called it up.

(Simultaneous speaking.)

MR. WIDMAYER: It's -- hey, Bill, it's Derek Widmayer. It's still there.

MEMBER KIRCHNER: Yes --

MR. WIDMAYER: So --

MEMBER KIRCHNER: -- it's there. It's --

MEMBER BALLINGER: I told the --

MEMBER KIRCHNER: -- it's, it's there, it's just in blue.

MEMBER BALLINGER: It's C.

(Simultaneous speaking.)

MEMBER BALLINGER: Oh, okay. I'm just, can't think in three dimensions, I guess.

MR. RECKLEY: Okay. Yes. But, yes, obviously that is -- that remains an important part of that combination of things you can consider, analysis testing, operating experience and, if needed, the use of a prototype, and this is where we bring in that prototype concept, from 50.43 (e).

MEMBER BROWN: Bill?

MR. RECKLEY: Yes?

MEMBER BROWN: Why are we fulfilling, as opposed to accomplishing, now, is there something -- the previous words said, must be demonstrated capable of accomplishing.

Then you, now, change it to a fulfilling functional design criteria. I -- that -- fulfilling just doesn't feel very fulfilling. No pun --

MR. RECKLEY: I --

MEMBER BROWN: -- intended.

(Simultaneous speaking.)

MR. RECKLEY: No, I -- I'll go back as -- you guys can imagine that, when we're doing this, it's somewhat analogous to your letter writing. So --

(Laughter.)

MR. RECKLEY: -- sometimes words -- sometimes words could change, then I, I'll be honest, I don't remember, why we changed it. It may have been late in the day.

(Simultaneous speaking.)

MEMBER HALNON: Hey, Bill, this is Greg. I -- I wanted to walk through a couple of terms, and if they've already been discussed, in previous meetings, we don't need to go into it.

But, in part, or a portion of Paragraph A, generally-accepted consensus codes, is that precise enough, for me, as a designer, to, to know what a generally-accepted code is, is that meant to be approved by the NRC, endorsed by the NRC and Reg Guide, or just an ASME, or ANS Code?

MR. RECKLEY: We were intentionally vague and thought that this could be picked up in guidance. In that, there is a way that it would be done, which is endorsed by the NRC, or, or accepted by the NRC, and that would be the most clean cut.

But there are other general -- there are other consensus codes and standards that, that we may have not have looked at, before the application, and we would look at it, in term -- in, in the context of that particular application.

And then, there are other places, where we just, depending on the analysis, sometimes, we just generally accept -- and this would, probably, be more oriented towards the best estimate calculations, under the second tier, where we accept generally-accepted consensus codes and standards, general industry practice, if you will.

MEMBER HALNON: Okay, so that was intentional. The next one was, in B, qualified for the service conditions, over plant lifetime and, during the operating reactors just, just reminded me of the mission and time argument that we're having and will it not, you know, plant lifetime is, is well-defined, you know, so you got licensed period, you got life time, other things that are there, is that -- was that intentional, as well, to keep it in the --

MR. RECKLEY: Well -- well -- yes. And, generally, we will define a plant lifetime, as being the license term. But, all we were trying to capture, here, is that you had to include things, not only service conditions that might arise from an event, but also radiation and normal service, you know, time and temperature effects some things and things like that.

MEMBER HALNON: Okay. Go ahead, was there a follow up?

CHAIRMAN BLEY: Yes. This is Dennis. I want to follow up on Greg's first one, on codes and standards. The language was generally accepted -- I mean, it -- consensus code is accepted, at least, by the group that puts it forward.

We've hung up, in the past, or the staff has hung up, in the past, because they'd endorsed a particular revision of a standard, it gets out of date, new ones come along.

And, yet, it, for some reason, was very hard to change the endorsement to the newer version and we've gotten, kind of, out of sync, with the standards. Is this, to some extent, an attempt to get around that kind of problem?

MR. RECKLEY: Well, it -- it --

CHAIRMAN BLEY: Maybe it should be.

(Simultaneous speaking.)

MR. RECKLEY: Well, it should, it should be easier, insofar as, at least, up to this point, in the iterations, we're not incorporating anything into Part 53, in terms of, consensus codes and standards that would take a rulemaking to change, as we do, now, for ASME pressure vessel code, in Part 50.

So the thought would be, most of this would be through guidance and, and that should be easier to keep up to date, than, than actually having to go in and make rule changes.

The other reason we're using, generally, this language, was un-attempt to be open to other approaches and, for example, we use this same language in the QA area, because there is some interest in seeing, if the ISO standards, or even, IAEA standard, I forget the number, GSR1, I think, might be used as the guidance and, thereby, help in the international marketing.

And our normal references have been to things, like, ANS and ASME standards.  So it was also just an attempt to be more open to other standards, other standard development organizations, like, ISO, for example, if it can be -- if they're shown to be okay.  So.

CHAIRMAN BLEY:  Thanks.  Ron's got something.

MEMBER BALLINGER:  Yes, again, with respect to these generally-accepted codes, isn't it a point of fact that, by the time the review is finished, all of the codes and standards that have been used, have been accepted, by the, by the staff.

And so you wonder, whether or not, you should reword it, a little bit, to account for the fact that, yes, they can start out with accepted codes and then, those that are, have not been accepted, by the NRC, would be accepted, as part of the review process.

MR. RECKLEY:  Okay.  We'll -- we'll --

CHAIRMAN BLEY:  I -- is this --

MR. RECKLEY: -- make --

CHAIRMAN BLEY: -- I mean, I think that's what, actually, has to happen, right?

(Simultaneous speaking.)

MR. RECKLEY: If -- if we haven't done it, as a generic measure, one way to do it would be through the application, as you're describing.

CHAIRMAN BLEY: Okay. So -- so --

MR. RECKLEY: You know --

CHAIRMAN BLEY: -- in the end, everything has been accepted, once the license is issued?

(Simultaneous speaking.)

MR. RECKLEY: Right. Yes.

MEMBER HALNON: And I had one -- I have one other issue, if you can --

MR. RECKLEY: Sure.

MEMBER HALNON: -- can handle it? In -- in Part C, there, security issues, more possible security issues are resolved. But I -- that leaves me wide open on what a security issue is, is that going to be defined, in guidance, as well?

(Simultaneous speaking.)

MR. RECKLEY: Yes, we are -- you know, there is existing guidance, on the safety security interface, and, and that's what we mean, here. There

-- there was some comments, on this particular item, and, and, in including it in the design.

When we get the integrated package together and look at the security requirements that will be in Subpart F, we might come back and look.

One of the reasons we included it was, after 9/11, the advanced reactor policy statement was changed, to include words, pretty much, like this that, we wanted, or expected, or were encouraging designers to look at, both, safety and security, as, as part of the design process.

MEMBER HALNON: Yes, okay. I -- I -- we'll wait for --

MR. RECKLEY: Yes.

MEMBER HALNON: -- the security, the word, issues, really leaves me wide open on that, that's the reason I was, kind of --

MR. RECKLEY: Okay.

MEMBER HALNON: -- hiding it, so. Okay.

(Simultaneous speaking.)

MEMBER BROWN: Bill?

MR. RECKLEY: Yes?

MEMBER BROWN: Just spring-boarding off of -- that was Greg, I think, that made the last comment, wasn't it?

MR. RECKLEY: Yes.

MEMBER HALNON: Yes.

MEMBER BROWN: All right. Okay, thank you. Safety and security must be considered together, in the design process, such that, security issues. When you're talking about security, what is the nature of the security you're talking -- you're talking about people getting into the plant?

MR. RECKLEY: Yes, I --

MEMBER BROWN: Is it physical security?

(Simultaneous speaking.)

MR. RECKLEY: Well, it would be physical and cyber.

MEMBER BROWN: Well, it doesn't say that. In Number --

MR. RECKLEY: Yes -- okay.

MEMBER BROWN: -- 2, right now, you're well-aware of, we've been trying to address control off access, outside. That's a design process, within the plant, relative to how data gets into, or out of, the plant.

Didn't know you were aware of that particular circumstance, right now, but the design process is separate, where I would -- how, how do I phrase this?

Cyber security, with viruses and everything else stops, when the Internet lines get into admin buildings and places that don't -- are not inside the plant boundaries.

Once you're inside the plant boundaries, you can't put virus software into a control system, a protection system, a safeguard system, a reactivity control system, or in your main, main control room, of those systems.

Your systems will just stop working. You'll be constantly updating them. So the design process needs, needs, somehow, to ensure that the, the staff, sans cyber can make sure that the in-plant design, inside those boundaries, is within the design purview.

I -- somehow, we ought to beef that up, a little bit, is all I'm saying, to make it clear, relative to -- that cyber is not inside the plant boundary.

MR. RECKLEY: Okay. I -- and, and --

(Simultaneous speaking.)

MR. RECKLEY: Yes. We are -- we are just crafting, as the, as the first, even, internal draft, the requirements for, both, physical and, and cyber security.

And -- and, for now, we're, we're linking to that, through Subpart F, the operations, because it's a security program.

But, one of the things that we will look at, and, and again, sometimes, we're putting things in here, knowing we need to go back, in the iterations, once we see how things fit together, that, if there are things that are design-oriented, they should go here, and if they are post-operation, they, they would go in Subpart F.

MEMBER BROWN: Yes, there are, there's very definitely a delineation, it, it's the -- once you hit the plant boundary, it's a control of access. You -- in the old days, with all analog systems, you had physical control of the access, was all you had to deal with.

Make sure the guys were cleared, they had the right stuff with them, and they had to get approval, from the main control room supervisors, in order to get into cabinets.

But, now, with the electronic access, there's this marvelous idea that, you know, you connect the Internet into everything. And, now, we can, we can do all kinds of stuff and send new software down and --

So it's a control of access -- it's a whole new world from control of access. So that part of it has to be within the design part, not programmatic, is what I'm --

MR. RECKLEY: Okay.

MEMBER BROWN: -- saying, in Subpart --

MR. RECKLEY: Yes.

MEMBER BROWN: -- F.

(Simultaneous speaking.)

MR. RECKLEY: Right. And --

MEMBER BROWN: But we've got to try to separate that, somehow. I know that'll create a -- some more discussions for you guys, because we're going through that, now, but --

MR. RECKLEY: Okay.

MEMBER BROWN: -- just, to make you aware of it.

(Simultaneous speaking.)

MR. RECKLEY: Good. Thank you.

MEMBER BROWN: Okay.

MR. RECKLEY: So -- so this is, like, I just wanted to pull the language up. And, again, suggest that, if -- that, that I thought this would be an area.

And I, I, for example, I, I even brought up that that fire protection, even based on this morning's discussion, we should probably mention, in the design area, as well as, support it in the analysis area and, currently, we only address it in the analysis.

So if there's other areas, or other things that we should build in that people think we're missing, I, I think, if you look in this area, it would probably be the most likely place to put additional detail.

It -- it -- so I'll -- I'll leave it, there. Ron, did you have another question, or is your hand up, from before?

MEMBER BALLINGER: Sorry, it must be up --

MR. RECKLEY: No?

MEMBER BALLINGER: -- from before.

MR. RECKLEY: So with that, Liz, if we can, go back to the slides. That was the design section, again, from a second iteration, we didn't change it, very much.

But, this might be an area, per the discussion, this morning, that, that we could look at, and make some additions, if people think there are areas that we're, that we're missing. So if we can down to --

(Simultaneous speaking.)

MEMBER KIRCHNER: I would just like to reiterate -- this is -- Bill, this is Walt. Yes, the theme, from GDC-2, 3, and 4, probably, should show up, here. That would include fire protection, as GDC Number 3.

So you're designing for it, and not just trying to analyze your way out of it, or use undue reliance on operating measures, to mitigate the fire issues. It -- it should be up-front in the, in the design --

MR. RECKLEY: Okay.

MEMBER KIRCHNER: -- features. As well as, things like, you know, of course -- of course, every new plant will tell you, Number 4 doesn't apply, because I don't have a large brake LOCA, but, what you'll, if you look at most of these designs, they do have potential for interfering energetically, or in an -- in some way, with a failure, with the safety functions, achieving the safety functions.

MR. RECKLEY: Right.

MEMBER KIRCHNER: An -- and then, of course, the, you know, designing for both, internal and external hazards. It -- it seems, to me, that's -- that could be pulled up, here, and --

MR. RECKLEY: And that's a --

MEMBER KIRCHNER: -- provides coverage.

(Simultaneous speaking.)

MR. RECKLEY: Yes, thank you, Walt. I -- I think that, we'll, we'll take that back and, and look at it.

Again, we -- the, the concept, I think, we've covered and -- but, sometimes, it's covered in the analysis part and, perhaps, it should be showing up in both places, with the analysis being, what analysis is, which is, which is usually a verification, but the design having to, at least, mention that you need to incorporate those things into the design.

So we, we will look and, probably, include some things, like fire protection. External events, though, you know, we talk about them, we define them to be within the licensing basis events, and then we mention them, again, under the analysis section.

But, you're right, they do show up, also, in the design, because there's usually something physical that you, that you need --

MEMBER KIRCHNER: Yes, I know --

MR. RECKLEY: -- to do.

(Simultaneous speaking.)

MEMBER KIRCHNER: Yes, exactly, it's usually design and the analysis confirms that the design will provide that function --

MR. RECKLEY: Right.

MEMBER KIRCHNER: -- that safety function, or protect --

MR. RECKLEY: Right.

MEMBER KIRCHNER: -- another system, from one of those hazards.

(Simultaneous speaking.)

MR. RECKLEY: Right.

MEMBER KIRCHNER: Hopefully, you're doing it, by design and not undue reliance on analysis, or, or programmatic operational --

MR. RECKLEY: Yes.

(Simultaneous speaking.)

MR. RECKLEY: Again, this is the kind of improvement, as we go through the iterations, just to make sure it's complete. The, the thinking was that, it wasn't just analysis, right, because we're thinking of the design process, as iterative, too.

So you do the analysis, then you change the design, you do the analysis, until you get where you need to be, but, but it only being under the analysis section, I, I'm agreeing, maybe, is not capturing it, fully, the way it should be captured.

And we have, we have the space, here, between the functional design criteria and the additional design requirements, to just make mention of all of those things, to make sure that they are, actually, within the design requirements, not just the analysis requirements.

So I -- that's a good catch and I think, I, I think we'll look forward to that, as we develop the next iteration. From a -- from a big picture, of where we were sitting, I don't think it changes anything, it just provides that the rule is more clear, in that regard.

So if we go down, to the analysis section, this is an area we changed a little more, in regards to feedback and so Paragraph A, under 53.450, the analysis, in the first iteration, basically, said you need, you need to do a PRA and it needs to address internal and external events and, and other things that may challenge the safety functions.

And, some of the feedback was that, they were looking for, some stakeholders were looking for other risk assessments, other than, probabilistic risk assessments.

Others wanted a more deterministic

approach to design and analysis, and we'll get to that, in Paragraph B. So we heard that and the change we made to this one, on the next slide, Page 46.

And, we didn't change much, in that, our iteration still requires, or still proposing to require, under the second iteration that a PRA be done.

And we did add -- I think, Dave, this goes to your comment, earlier. One of the reasons, now that we maintained it, was to support showing that you meet the second tier safety criteria, which is the, the QHOs. So -- Vicky, I see your --

MEMBER BIER: Yes. Again, being new to some of these discussions, I just have a quick question, about, do we, or does the NRC, believe that there is, kind of, a demonstrated accepted approach, for PRA of passively safe designs?

(Simultaneous speaking.)

MR. RECKLEY: So well currently and -- currently, for, for light water reactors, including the, the passive designs, we have an ASME, ANS standard that the NRC has endorsed, under Reg Guide 1.200.

There has just been issued, lately, a couple months ago, from the, from the standards development organizations, a non-light water reactor, excuse me, PRA standard.

And the staff is currently reviewing that, with the hope of endorsing that standard. And so we would have PRA standards available for light water and non-light water reactor designs.

CHAIRMAN BLEY: Well -- this is Dennis I just want to inject something, for Vicki. In a couple of the more recent design certs, and even, in some of the earlier ones, for passive plants, we had recommended that, not recommended, but we had suggested, as well, yes, recommended.

But, they, ensuring their PRAs, to examine the possibilities of some kinds of upsets, to the expected conditions that would allow the passive systems to work.

Most of those PRAs included, at least, a factor, to account for that, getting it refined to the point that, you believe it, or it has a small amount of uncertainty, is something for the future, but, they've all been trying to, at least, account for it, in some ways.

And I wanted to toss something in, on my own, Bill. And it's something, about my background being different, from those people, who have lived at

NRC, for a long time.

The staff, through the guidance documents, is pretty well-defined, what is a PRA, and it is a fairly, a very complex, large-scale analysis.

Another approach that I've been involved in, for a long time, and has been used more extensively in non-nuclear kinds of facilities, but also, in some PRAs, for nuclear facilities, in a phased approach, to start with a simplified PRA and use that, to help focus the work, you know, the final one.

And there are techniques one can use to simplify the PRA, but, but, you know, back to something Jose said, the one part, you can't really simplify, without getting into big trouble, is to search for what it turns out to be design basis events.

But, in the PRA, it's the initiating events and the scenarios, you, you have to identify that, fairly completely, but you can simplify other parts and bound some parts.

I'd be more comfortable, and this is personal, with that kind of clear definition of what is a PRA, rather than saying, and other kind's problematic approaches, or whatever the language says, now, it's something like that.

But that's just a comment and, maybe, I can supply some papers and things that, that would clarify that, a little bit, but I wanted to get that in the record. All right, somebody else was trying to talk?

(No audible response.)

CHAIRMAN BLEY: I guess not. Go ahead, Bill.

MR. RECKLEY: Thank you, Dennis. And we do have a working group, looking at this particular topic and you're well-familiar with Marty Stutzke, he's, he's, kind of, leading that, so if you wanted to send him any of those references, he, I'm sure, he would appreciate it.

But -- but, we're looking at the perception that, when we say PRA and people see these, you know, 800-page standards that, that it might be too much.

But, on the other hand, and, and this goes to what you're saying, it needs to be complete enough. And, one of the things that we'll talk about, in a month or so when you, when you see Subpart F, on operations is, what are the things that we carried forward from NAI 1804?

Is that -- the PRA would be done and it is supporting the assessment of what you just mentioned, the various scenarios and, also, the required reliability of the structure systems and components going into those scenarios, to show you meet the metric.

The QHO, in this case, under LMP, it would be the combination of, both, the frequency consequence curve and the, and the QHOs.

But the importance of that was, under the Commission, under an older Commission finding, from the early 2000s, and incorporated into, into NAI 1804, is that, the PRA and the reliability programs support, not including the single failure criterion, in the design.

And, you know, I'm cautious, because I might, you know, hit a nerve here, but if you went through the design, you'll not see the single failure criterion show up.

That's because, the assumption is, the PRA is being performed and reliability measures will be assigned to the, in particular, the non-safety-related, but safety-significant SSCs, to, to support the metric.

And -- and that's an important part. If

-- if you push too far and, and it becomes that we can't define such a reliability, a system, then the -- it would come into question the, the basis for not requiring, for example, the single failure criterion.

And so we were looking at this, as an integrated approach and that's why -- that's one of the reasons we've kept Paragraph A, even though, if you go on, now -- if we go on to the second paragraph, Paragraph B, we, we made a change to this one.

CHAIRMAN BLEY: Bill?

MR. RECKLEY: Yes, go ahead, Dennis.

CHAIRMAN BLEY: Two things and then, I'd like to get to Vesna and Jose. Are -- and I'll save the answer to this question, until they speak. But, will the discussion you just provided, be written down, somewhere, for all of us to see, at some point?

And the other is, I don't know, if it will be available outside of NRC, but in the middle of next month, Nathan Siu will be giving a seminar that, at least, from the title, it sounds like it'll be getting at some of these issues and, you folks, might be interested in seeing that. Vesna, are you're -- you were up, first.

MEMBER DIMITRIJEVIC: I just wanted to say that my position on using the PRA is strongly dependent, can we define to what degree they use the PRA results with improved regulation? And I just heard that they're staying on the single-failure criterion, and that's where the PRA can help.

But you don't need the full-blown PRA to help with the single failure criterion. You don't need the full-blown PRA to help you even with the selection of design-basis events.

So, to what degree the PRA makes the existing regulatory requirements better, is something that would be well to define, so that we can define is it really full-blown PRA needed, or different degrees of the PRA.

CHAIRMAN BLEY: Thanks, Vesna. Unless Bill wants to jump in right there, I'd go to Jose now.

MEMBER MARCH-LEUBA: Okay, this is Jose. Yes, you do raise a concern with the single-failure criteria. My understanding is only those systems that are safety-grade are assumed to work.

Every other single system that is not safety-grade during the analysis, is assumed to be failed in the most damaging condition. Is that correct?

MR. RECKLEY: For the design-basis accident -- for the DBA -- yes.

MEMBER MARCH-LEUBA: So, you're talking to the joint design-basis event. You're going to give credit for the non-safety register, but no single-failure criteria.

MR. RECKLEY: That's currently what is in the Reg. Guide 1233. Yes.

MEMBER MARCH-LEUBA: The wisdom of our elders when they designed all these things, is there are failures that go undetected.

And therefore, unless you do a really, really, really good, sophisticated analysis on your priority, which I don't give credit to these guys, you're not going to know that one of your counter rolls is bound by the guys, because you don't know.

I'm extremely uncomfortable with that. Okay? You have failures that go undetected always. I mean, that happens on your car every time you try to start it on a cold morning.

I don't know how probabilistic the PRA guys are going to put probabilities into the probability of my car going to start tomorrow.

MR. RECKLEY: Yeah. And to some degree, we hope that that particular issue is addressed through the requirement to have defense-in-depth. It may very well be a non-safety-related system that's providing defense-in-depth for the safety-related system within the PRA analysis --

MEMBER MARCH-LEUBA: Okay, we have established that for design-basis events there are no non-safety-grade equipment. They fail in the most damaging condition. You only take use of safety-grade equipment. Is that correct?

MR. RECKLEY: For the DBA. For the DBA.

MEMBER MARCH-LEUBA: For DBAs. For beyond-design-basis events, you are going to take credit for everything for everything that you installed.

MR. RECKLEY: Correct.

MEMBER MARCH-LEUBA: And that there are failures that go undetected. That happens everywhere.

MR. RECKLEY: And that's part of --

MEMBER MARCH-LEUBA: And that's our elders put the single-failure criteria. I'll leave that for the record and you think about it. But it is not very comforting. Your position.

MEMBER KIRCHNER: Well, Jose, this is Walt. I kind of agree with you. I think the way to test what you're suggesting, a different way to evaluate defense-in-depth is to just go through, with or without a PRA -- PRA is a very sophisticated way of doing it -- but just old-fashioned engineering analysis.

Just go through your systems and assume a single failure. And then, evaluate the consequences of that.

MEMBER MARCH-LEUBA: Which is exactly what we've been doing for the last 50 years.

MEMBER KIRCHNER: Yeah. But I think Bill and his staff have made an improvement. At least now, they seem to have elevated defense-in-depth into the integral part of the design process, rather than some kind of bookend, where after you've done everything, you see if it's okay.

So, personally, I believe in defense-in-depth as part of the design process, not some after-the-fact check.

But I think your issue, Jose, could probably be best addressed in that manner, with or without the PRA, by just looking at your -- especially starting with the DBAs, and then going on to the beyond-design-basis events.

MR. RECKLEY: And there's some degree that that's done if you look at the IAEA-5 levels and the way it's assessed by just looking at what SSCs are, for example, keeping you from going from one layer to the next, under that scheme, from AAOs to DBAs, to design extension, and then, ultimately, to level-5 for the offsite response.

CHAIRMAN BLEY: Bill?

MR. RECKLEY: Yeah.

CHAIRMAN BLEY: I've got to jump in with just a comment, after the last couple. When the analysis is done in a PRA, when you look at a particular combine, you look at the chance it's failed before the event starts.

You look at the chance it fails when it tries to actuate when the event starts, and you look at the chance it fails during the continuation of that event. All of that is included.

When we did the first PRAs, we found that there are some double failures that are more likely than single failures in other places.

And some of the places where we can't tolerate single failures, we assume they won't happen too, in the standard way of thinking of things, where in the other analysis, you look at the chance it might happen. So, go ahead. I just wanted to --

MR. RECKLEY: No, no, thank you, Dennis. That's a good clarification in correcting my shorthand.

The PRA and the beyond-design-basis events take into account all the equipment at the plant, but what's going into the sequences is various combinations of what works, what doesn't work, as you just said.

So, on slide 47 in paragraph B, this is the first iteration. We basically took and said paragraph A of PRA is required. Paragraph B, you shall use the PRA to determine your licensing basis event to support your safety classification of equipment and evaluate defense-in-depth.

And this was consistent within NEI 18-04 and the LMP approach. But one of the comments that came back was, some designers, some stakeholders, were interested in a more deterministic approach.

Sometimes examples are brought up of either the CNSC -- the Canadian Nuclear Safety Commission -- or IAEA guidance in specific safety requirements 2/1, that looks a little more like the NRC's more traditional approach of assessing initiating events, and then assessing them through the event categories and anticipated operational occurrences, and design-basis accidents and design extension conditions.

And so, if you go, Liz, to slide 48, in

response to that we basically changed the language to say that the PRA or other generally accepted risk-informed approach to systematically evaluate engineered systems -- it's a lot of words -- but basically, another systematic approach, or a combination of the PRA and a systematic approach, such as -- a potential example would be the IAEA SSR 2/1 approach.

You could use those approaches to determine your events and to classify your SSCs and evaluate defense-in-depth.

But as we said, we would still expect a PRA to be performed, because we were carrying the reliability data that you get out of the PRA into the operations area to support other assumptions within this part 53 structure.

MEMBER DIMITRIJEVIC: Well, I just want to add, continuing with my comment, I think that these definitions how PRA should be used are very good for design-basis events, support safety classification, defense-in-depth.

However, if we want to use the PRA to support that you are meeting safety goal, or quantitatively you have objecting, then you need the full-blown PRA to do those things. These three things that are listed here, you definitely don't need the full-blown PRA. You can both support the license-basing events, termination of system classification, defense-in-depth, without doing full-blown PRA. Level three PRA.

MR. RECKLEY: Okay. Yeah, I think we would agree with that, but I'll --

MEMBER DIMITRIJEVIC: But then, if you want them to demonstrate that they meet safety goals, then they need the totally full-blown PRA.

MR. RECKLEY: Right.

MEMBER DIMITRIJEVIC: I mean, so those are to these different steps. The missteps. Do we need the full-blown PRA, or we can just use PRA to support these inputs.

MR. RECKLEY: Right. And so, this approach is similar to, but maybe a little beyond, what we currently do in part 52. In part 52, for the Gen III designs that we looked at, they were using this kind of approach.

They were using more traditional ways to assign their licensing-basis events, some variation of the old PWR or BWR design criteria, they were using fairly traditional approaches to safety classification, etc.

And then, they did the PRA as a verification tool. And we would look at it in chapter 19 to see that it met QHOs and so forth. But it wasn't a first-line regulatory requirement, if you will.

It wasn't establishing, per se, requirements. It might introduce a rationale for regulatory treatment in non-safety systems, but by and large, it was a confirmatory-type analysis.

This lets the designer design the plant the same way. But we do elevate the use of the PRA, again because we're looking forward and saying, we want an even stronger reliability assurance program for the non-safety-related, but safety-significant, structure systems and components when we get over into the operations area.

And again, it was part of the rationale under Reg. Guide 1.233, for other things, like an alternative to the single-failure criteria.

Let me see, are there hands up, or were they previously?

MEMBER MARCH-LEUBA: I didn't bother to raise my hand, but I wanted to make -- my brain is having a siesta. It's after lunch, so you don't think very -- but do explain to me, I believe PRA is used to identify the frequencies of AOOs, DBAs, and the on-design-basis events.

Okay, once you run your PRA and you figure out that this particular event is beyond design basis, what role does PRA play after that? I'm think back again to the single-failure criteria.

When you're analyzing these beyond-design-basis event -- the PRA told you it was beyond design basis -- what role does PRA play? How will you consider the single-failure that we used to consider, properly so? Read the transcript and think about it. You don't need to give me an answer.

MR. RECKLEY: Okay.

MEMBER MARCH-LEUBA: But replacing single-failure criteria with a PRA analysis makes absolutely no sense whatsoever.

MEMBER PETTI: I have to disagree with you, Jose. I think you don't understand what PRA does. In fact, PRA allows you to figure out what are the important failures in a system that consists of a number of components, so that you don't just arbitrarily pick the wrong one to be the one that you're going to fail. It allows you to do a more balanced approach to managing the risk in --

MEMBER MARCH-LEUBA: No, Dave. No Dave,

I understand it pretty well.

(Simultaneous speaking.)

MEMBER PETTI: That's how we -- we've look at, we've reviewed it. I don't know what more to say there.

MEMBER MARCH-LEUBA: No. Dave, what you're saying is there are multiple beyond-design-basis events. There are some with component A fail, with component B fail, with component C fail. Those are three different beyond-design-basis events.

And they're all beyond-design-basis events. And you have to analyze them with the component fail to know what the consequences are.

They all have been determined to be beyond-design-basis by the PRA. Now, you have a class of beyond-design-basis events with component A fail, B fail, C fail, D fail.

And typically, what we've done is to pick the worst if you don't want to do them all. But if you want to do a PRA, you'd run them all. But you still pick the worst.

MEMBER PETTI: The one thing the PRA will do -- and Marty or somebody can weigh in, and this is one of those discussions we could go on -- but it also looks at the combinations of A and B failing, and B and C, and A and C, and that's a little different than the single-failure criterion did.

MEMBER MARCH-LEUBA: And if you're telling me that you're going to analyze all of them and pick the worst, I'd be very happy.

MEMBER PETTI: Well, they'll be all analyzed and considered in the comparison to the metric, which, in that case for the beyond-design-basis event, is playing into the metric of the QHO.

MEMBER MARCH-LEUBA: Correct. So, you will pick the worst from the QHO point?

MEMBER PETTI: No, they're all considered. I mean, they're all analyzed, they're all considered, they're all thrown into the mix, to contribute to the overall risk that then is fed into the comparison to the QHO, down to the point where the frequencies are so low that they're screened out. But any of those --

MEMBER MARCH-LEUBA: So, you're telling me that therefore the BDV -- the beyond-basis-events -- you not going to do one calculation with a single failure, but you're going to do a hundred, because you're going to consider multiple failures, multiple combinations of failures, and you're going to do them all and pick the worst.

MEMBER PETTI: I'll defer to somebody like

Dennis. I mean, yes, there are many, many scenarios. I don't know what the numbers are, but I'll either defer to Marty to chime in, or Dennis, or somebody who does PRAs. But yeah, you're basically assessing many, many different scenarios.

MEMBER MARCH-LEUBA: So, you're not doing single-failure criteria. You're doing multiple single-failure criteria.

MEMBER PETTI: Well, you're doing multiple failures. Right. Right.

MEMBER MARCH-LEUBA: And 10 CFR 53 says thou shalt do this.

MR. RECKLEY: Yes, because for us, and this is the importance of having the PRA standard available, that's what the PRA standard guides people to do, and that's the hundreds of pages of the guidance in the standard to identify the scenarios, to go through that logic of doing the analysis, and then modeling them to see what the actual plant behavior is. But again, I'm getting dangerously into beyond my --

MEMBER MARCH-LEUBA: Yes. Speaking of the horse again, I mean, you're not doing single-failure criteria. You're doing many more single-failure analyses.

MR. RECKLEY: Yes, you're analyzing many failures and many combinations of failures. Yes.

MEMBER MARCH-LEUBA: And you have to analyze them all and pick the worst. That is now completely ridiculous from the frequency point of view.

CHAIRMAN BLEY: I think where people are hanging up, Jose, is not knowing quite what you mean by picking the worst. You're looking at them all and the results of each one.

MEMBER DIMITRIJEVIC: Well, I assume Jose means picking for the chapter 15 analysis. You know, we analyze those sequences, but each ones will be rounding the deterministic part. That's where the signal failure comes in.

CHAIRMAN BLEY: We can talk about this more next week at our certification session.

MR. RECKLEY: Yeah. Okay.

CHAIRMAN BLEY: Joy has been waiting patiently.

MR. RECKLEY: Okay.

MEMBER REMPE: It's a different topic, so I was happy to wait patiently. So, if I understand this, which I did not understand until this meeting, you are allowing other risk-informed approaches for the three items shown in this slide, but then they still have to have a PRA for the comparison with the QHOs.

What if the PRA shows their other generally accepted risk-informed approach didn't quite pick what should have been picked for the LBEs or the SSCs? Is that a possibility?

MR. RECKLEY: If it were to show up that they actually didn't meet the QHO because whatever methodology they used didn't pick the right LBEs, then they would have to go back and make a change.

Likely, they'd have to include a design change, and then evaluate a new LBE, because what we would get out of that is whatever systematic approach they used missed something.

MEMBER REMPE: Right. And I'm just wondering. I guess I'll have to see some examples, to see if that can occur. But hopefully, they're thinking about that as they go with this other approach that they prefer.

MR. RECKLEY: And realistically, if you look at the history of -- for example, doing the designs, and then doing the severe-accident-management alternatives -- the SAMA -- you can do a design under a systematic approach and the PRA would confirm that

that design meets the QHOs.

I think that would be the expectation. And I think that's the feedback from stakeholders, is if you look at the history, the PRA has confirmed their other systematic approach, so why not let us use it in the first place, and then do the PRA as the confirmatory tool. And under this iteration, we're saying that's okay.

MEMBER REMPE: Yeah. I guess they're going with the maximum credible event, is where I'm thinking they might get into trouble later on, because I don't know what risk-informed approach they used to select that event.

MR. RECKLEY: Yeah. And we would have to look at that. And our thinking on that has somewhat been that, again, to the degree that you do the assessment, and going back to the barrier approach, that you have a large number of your events that don't challenge even your first barrier.

The assessment doesn't need to go all the way out and run a max run if there were no radio nuclides that made it past the first barrier. Right?

And so, if they're able to pick a maximum hypothetical, or maximum credible event, for the purpose of limiting how much analysis they need to do, because they're able to show that all of the events that maybe are more likely to occur, the whole other spectrum of events can be bounded, and that all the radio nuclides stay in, for example, the fuel form, we don't see that as necessarily a big gap in terms of the PRA. They could do the PRA and show that.

They don't have to run out and show what the performance of the fourth barrier is if the radio nuclides don't make it past the first barrier.

So, again, we're looking at this question of the PRA and whether simple designs can in fact have simple PRAs, either under the standard, or under some alternative approach.

We're currently looking at that. We don't want to make people do more analysis than they need to do, but we certainly want a systematic assessment to show that the reactors are safe. And that is in large part -- because we're going to get to this tradeoff of analytical margins -- many of these designs are also the ones that don't want staffing, or want much, much reduced staffing.

They want to be closer to population centers, or at least not the 20 miles currently in the guidance. They probably don't want emergency planning zones that go out very far, if at all, past the site boundary.

And so, they're going to be trading off these margins for what we're calling operating flexibilities, and you have to be very certain that that margin actually exists, before saying that they can trade it for these other alternative approaches, in terms of emergency planning, siting, staffing, etc.

CHAIRMAN BLEY: Bill?

MR. RECKLEY: Go ahead, Dennis.

CHAIRMAN BLEY: I want to try something. And I think I see where you folks are. I'm very pleased that you've opened the door to doing a simplified analysis of the design that supports that.

I think you need to do more work on getting the words right about what that could be and what could be the factors that lead to it and how one simplifies it without sacrificing confidence. And it sounds as if you're headed that way. So, I expect this is going to change over time. And whatever your working groups come up with, we'll be really interested in seeing.

And we've been talking about some related issues. And we may have a whitepaper that we will -- if the committee sees them and goes along with them, that we will provide them later on. But that won't be for a little while. So, I think you're on the right track but it's still kind of vague (audio interference) and I suspect in yours too.

MR. RECKLEY: Okay, thank you, Dennis. And then, it's not only our internal working groups, but the industry has some working groups and we're looking to them as well, because they're the ones that have an alternative in mind.

And so, as they're able to more clearly explain to us what those alternatives are, I think that'll be a great help to us and our own working group. So, with that, that -- go ahead, Dennis. I'm sorry.

CHAIRMAN BLEY: I would use the acronyms. But is that primarily the ARCAP folks?

MR. RECKLEY: No, this is actually just working groups on part 53.

CHAIRMAN BLEY: Oh, okay.

MR. RECKLEY: So, this is a different group, Basically, the collections of designers under either Nuclear Energy Institute, or US Nuclear Industry Council, have like working groups and they are discussing and planning to provide us some more information on possible alternatives.

So, let me see. We can go down to the

next slide, I think.

MEMBER PETTI: Bill, hold on. Just let me share if I can understand everything that you've said about this. Let me just think about, it's a micro-reactor. They do a search, like we've talked about, to come up with events to do the three bullets there on slide 48, and they come up with sort of three to five classes of events that look like the worst from a dose perspective.

They do the calculations. And in all cases, every scenario there is under one of them. So, you think about putting it on the frequency consequence curve and it's all the way to the left.

Can they just say, okay, we meet the QHOs now, because sort of by inspection these cases -- look, we're not challenging anything? Can it be that simple, in terms of getting there?

MR. RECKLEY: It may be that if -- and we've done a little work to say, what kind of results would you need to basically show that you meet the QHOs with a simplified analysis, and it's possible.

MEMBER PETTI: I'm just wondering if there's a simplified metric. Because I know on the large LWIs we have metrics, but those aren't really going to work for some of the advanced reactors. And so, if there were a simplified metric that could be developed, that might help too.

MR. RECKLEY: Yeah. And we'll look into that some more, and would expect hopefully that some of the designers are able to do that as well.

MEMBER KIRCHNER: Dave, this is Walt. That's what I was hinting at this morning with my comments. For example, the 25 REM is the surrogate for adequate protection. At least that's a simplistic way to look at it.

And for the QHOs, it would seem to me that some ghost level would be a surrogate, and then that might relieve them from investing an enormous amount in a full-blown little three PRA that is perhaps questionable, depending on the security of the design to begin with.

MEMBER PETTI: Right. Yeah, I mean, I'm very supportive of the three bullets on 48, because that, in my mind at least, my simple mind, is that's the risk insights that you really need to make a better design.

MEMBER KIRCHNER: Yeah, exactly.

MEMBER PETTI: Because if you make a really good design, then a lot of this stuff should just not be a problem. And then, if they can do simplistic calculations and show that everything's okay, is that good enough? I think that what some of the questions are. Thanks, Bill.

MR. RECKLEY: Okay. We've done a little thinking. We'll think some more. I mean, basically in the end that's like taking a contamination level, if you will, and making some assumptions, and then backing it up -- right? -- reverse engineering from the dose to say, what release results in a challenge to the QHOs?

And so, we'll look. It's a little more complicated than that, but we'll look. We've been given some thinking, and again the industry's been giving some thinking to it as well.

The other analysis requirements, in terms of the maintenance and upgrading of analysis, the qualification of codes, the analysis of the DBAs, will go on. We did get some comments on those and I'll go through the second iteration on these other requirements.

So, in terms of the second iteration -- which one do I have? So, for some of these, C and D in particular, we need some tweaks, especially in terms of upgrading analysis. Now, we refer to the consensus code in standard for upgrading, as opposed to our first iteration, where we said it should be upgraded on -- I forget, every two or four years -- and we maintain what I call a placeholder, for some things like fire protection.

And then, this goes to what we talked about earlier, that fire protection currently shows up in analysis, and maybe we need something under the earlier design requirements as well.

But we did add paragraph E, if we go to the next slide, slide 51. So, this was just an addition to try to clarify that the analysis of licensing-basis events needs to be performed, and that it would be used to show that the design criteria were basically sufficient to show that you meet the QHOs, and to show you meet the defense-in-depth requirements.

And so, this is basically, if you look back at NEI 18-04, this is the anticipated operational occurrences, the design-basis events, and the beyond-design-basis events. One of the things, again, we're using slightly different terms, just to avoid the perception that we're codifying NEI 18-04. And so, we say things like, very unlikely events, versus beyond-design-basis events. But they correspond to each other.

So, this was just basically we had added this because we thought it was not clear that, where it was a potential void in terms of actually describing that you needed to analyze the licensing-basis events.

It may have been clear given other language but we were afraid it wasn't, so we added this section. Technically, we don't think we added anything but clarity. So, if we go on then to the next one, it's paragraph F, which is the analysis of the design-basis accidents.

And one of the things that we did add here -- and this was in part to address the comments during an ACRS subcommittee meeting -- was that the design should go at least out to safe, stable in-state and showing that you meet the criteria.

We'll continue to look at this in the language. Even safe, stable in-state is -- a lot of discussion over the years as to what that means. So, there might be guidance that would come out to further clarify how the design-basis accident analysis would be done.

We refer, in Reg. Guide 1.233 to the existing guidance for light water reactors on how to do these DBA assessments. But it might be an area where additional guidance would be useful. We'll talk to stakeholders and make that determination.

So, if we want to go down to the next one, Safety Categorization and Special Treatment, we, under this construct, keep the traditional safety-related designation more or less as it's defined now, in terms of the way we subsequently talk about it, in terms of bringing in Appendix B for design, for procurement, for maintenance, how it would be addressed in technical specifications, and so forth.

And then, we introduced the non-safety-related but safety-significant, which again is largely the process described in NEI 18-04 or earlier concepts, even somewhat analogous to 5069 for the risk-significant SSCs.

But we use these terms and we're including in the requirements that this is the safety classification system for part 53, safety-related, non-safety-related but safety-significant, and not-safety-significant.

There are some comments that again maybe could be more flexible. The IAEA has slightly different terminology for the safety categories and related classification, but we didn't change it.

If you go to the next slide, we didn't

change it in this iteration 54. These are editorial. We think we will define some of these terms, so we didn't need to do it here. They'll show up in definitions. That's the editorial change.

But otherwise, we keep the designations. So, that'll be a continuing dialogue, I believe, with stakeholders, with us having a defined system, and some stakeholders maybe wanting more flexibility, or even somewhat undefined requirement to have a classification system, but leave it open as to whether it's one such as we're proposing, or maybe one under a different scheme, like the IAEA standard.

MEMBER KIRCHNER: Bill, before you go on, this is Walt. You know, over the years, we, the committee, have had many presentations from NRR. And different parts of the organization use different -- how should I say it -- categorization approaches.

Often, we have charts that have like four boxes. They will have safety-related; not-safety-related; important-to-safety; important-to-safety, but not safety-related.

And then, you have terminology like important-to-safety, which I don't think has shown up yet in CFR 53 --

MR. RECKLEY: Quite on purpose.

MEMBER KIRCHNER: Yeah, good. Thank you. So, again, it's just one member's opinion. But in the interests of regulatory stability, certainty, etc., etc., making this three-part definition I think is very important.

Well, that's probably enough said. But I found in the past at least confusion on my part. Maybe it's just mine. When I get these different sets of terminology, and then in different approaches to doing reviews, so to the extent that 10 CFR 53 is fairly straightforward on what this terminology means, I think it actually helps regulatory predictability and certainty.

MR. RECKLEY: Okay, thank you. I mean, from the stakeholders' view, what it might complicate is, in an international market, the need to crosswalk between ours and IAEA's, or something like that, for example. So, we'll listen.

MEMBER KIRCHNER: But that's the applicant's problem. That's not your issue. You're the NRC. You're the authority. I think you should do what you think is best for the interests of the agency and the public, and whether someone wants to export a reactor, is a secondary consideration at most. Again, one person's opinion.

MR. RECKLEY: Okay. Well, we did keep it the same in the second iteration. So, we've not changed it yet. And our proposal is to keep it. And again, I think to the degree there's an ability to crosswalk between systems, they're not that dramatically different. But we'll see what further comments stakeholders have.

So, if we go then to slide 55, this is an important area. But we didn't get many comments yet on it. And so, I think a lot of people are waiting to see the release of Subpart F and start to see how the operational flexibilities come into play.

But basically, this requirement, it says that if an applicant is going to adopt a more restrictive measure -- and this is somewhat similar to what Dr. Petti was mentioning -- that instead of saying we're going to worry about the QHOs, that they basically say, we're going to have a design goal for emergency planning less than one rem, over 96 hours at the boundary, or for siting, one rem over the month.

The staffing, we haven't determined yet what kind of criteria we're going to set up for various proposals for licensed, non-licensed, and potentially autonomous, operations.

But you can imagine there might be different alternative metrics set up for those various proposals.

But once you do that, you have to maintain it. And you have to build that in as if that's your new acceptance criteria, and you have to maintain it through your operational programs. You have to set your reliability targets for your equipment based on this new alternative metric.

You basically have introduced something that you now have to incorporate throughout the analysis, throughout the design, and throughout the operations, to maintain it.

Because it's not just come in on day one of your application and say, my emergency planning zone can be a defense because it's less than one rem and a one-time decision, and then, ten years later, do a power-up rate or some other change, and undermine that underlying analysis that said you don't need an offsite emergency planning zone.

So, that is basically what this requirement sets up, is you have the ability to trade it off for operating flexibilities.

But the requirement now is you have to build it into the design, you have to build it into the maintenance and operations, to make sure you don't undermine the operating flexibility that you justified through the analysis.

So, that's the importance of this section. But, again, we didn't get much feedback, so we didn't change it. But people are waiting to see some aspects of Subpart F before they weigh in, I believe.

CHAIRMAN BLEY: Bill?

MR. RECKLEY: Yes.

CHAIRMAN BLEY: You talked about this with us before. I'm curious about how this maintenance gets built in. This becomes part of your licensing basis? Would you have to get a change in the license later, to change this? Nothing's really clear in the words here, other than you have to maintain it. And what do you guys at NRC track it later on, to make sure they're not cutting into it?

MR. RECKLEY: Yeah, we haven't written it yet, but my vision is that yes, it has to be maintained through all the licensees' programs. And if there is any undermining, that that's where I mentioned before, reporting requirements, or Subpart I, on maintaining the licensing basis, would come in, and that they would need to address it.

I mean, most of the time what this would entail is, somebody considers something, they do an analysis and say, oh, we can't -- if the results showed this, they'd say, oh, we can't do this because it would increase our offsite dose and we're using the decreased dose to justify XYZ. But if they wanted to proceed with that change, then decisions would have to be made.

Are you going to -- again, I don't think this would happen very often, but do you want to introduce an emergency planning zone outside your fence because your dose went up?

Again, bad example perhaps, but I'll say power-up rate? It's a business decision, right? I want to operate the power. Now, I get to trade it off against -- what I originally said was, I want the cost savings in not having an emergency planning zone.

But maybe years later, they say I want to do the power upright and I'm going to introduce an emergency planning zone. That would be their ability to do that.

Yes, it would take a licensing action in order to make that kind of change. And again, I don't think it's a good example, because it's unlikely to happen. But this system has to be in place to make sure that they don't undermine the operating flexibilities that's been granted.

We just want to get away from any notion that you do an analysis on day one, get your license, and then it's now good to go, that you don't need an emergency planning zone. That's only true if you maintain all the assumptions that went into that decision.

MEMBER KIRCHNER: Well, Bill, actually it's a good example, although maybe it's not the EPZ. But uprights are just -- I mean, I know everyone says small, modular is -- smaller is better, and all the rest.

But I can guarantee you economics is a factor. And they'll be back to try and upright the power. So, whether it's the EPZ that's traded off, or just re-analyzing whether you still meet your 25 rem criterion, but yeah, there needs to be a system to track that if they've made that prior trade, and then come back to you and say we want to upright the power by 20 percent, what's the implications there?

And it might not be EPZ, but it could be things like where the exclusionary boundary is.

MR. RECKLEY: Right. And again, so yeah, that's really what we're trying to do here is both enable the tradeoff, but then also to reflect that once that tradeoff is made, you need to maintain all of the assumptions, all the design and stuff, that went into it.

MEMBER KIRCHNER: A couple of related questions, because you've got me thinking as you've answered all this stuff. Some of these aren't exactly related.

Do these end up as license conditions if part 53 allows design certs and part 52 -- I'm not sure why this happens. In part 52, for every design cert we have an amendment to the rule. It's added at the end.

We don't do that for licenses in part 50. Have you thought about that kind of stuff? Does that belong in here? And is it going to be better, or is there some other way to do that?

MR. RECKLEY: We haven't exactly worked out how this will get reflected in the licensing documents, per se. But along with this requiring the licensee to maintain it, when we do Subparts H and I, we will be building in what is the appropriate way to make sure that the licensing basis for the plant is maintained as well.

So, this is kind of on the engineering side. On the licensing side, we haven't worked out exactly where this would go. But it would have to be something to basically accomplish the same task from the NRC's perspective.

When do we need to get involved? And again, I don't want to overuse it here, but something like the emergency planning zone would require us to come back in, because it's also going to bring in FEMA.

It would be a big deal to go from having none to requiring one. So, that would need to get us back involved, along with other federal agencies.

There may be other areas, as Walt was saying, that maybe the tradeoffs would have a less need for either a license amendment or a role change, if it's done through design certification.

But we'll see. We're just starting to write those sections. This is something we'll need to address, but I can't specifically say how we're going to do it yet.

MEMBER HALNON: Hey Bill, this is Greg. Just is sort of the point I was making earlier about the things that transcend through the design and into the licensing basis, licensing document, textpack, whatever.

I would suggest that you task the industry group to come up with some ideas on -- especially the ones that have been operating reactors -- tracking commitments, tracking the licensing basis.

Because this really gets into the shift manager and the control room during operability calls and other things that may occur, that the ability to go put your fingers on right criteria, right design, right information, is critical, sometimes in a pinch.

So, it might be a good idea to get somebody to do this from the industry, on how different plants do it today. And maybe take the best of the best and incorporate that into some guidance for practice and/or how this thing transcends through the licensing basis.

MR. RECKLEY: That's a good idea. Thank you. And yeah, again, as we get into these sections F, H and I, I think that'll be an opportunity.

And we may very well identify either additional guidance, or maybe, like you mentioned, maybe there's existing guidance that could be just tweaked to serve this purpose. But we'll look at that.

Anything else on 55? Okay, if not, Liz, if we can go to 56. This is basically what I just mentioned. We didn't really change this, but we expect the discussions on this requirement to continue into the future, so it might get revisited in a future iteration. So, if we go to 57.

Likewise, we didn't get too many comments on either design interfaces or design-related quality assurance, and therefore, we didn't make any changes to those sections.

But as with everything, as we go forward and people start to see the whole package, we might revisit some of this.

And we talked about QA earlier. We took out -- I'm going to forget what criterion it is -- the design criterion 6, I think, and put it here in the design section out of Appendix B.

And then, we have a bunch of other QA requirements and construction. And then, we have some in operations.

But to the degree that starts to be repetitive, we've even talked internally; if it makes more sense to put it back together as an appendix, like Appendix B is now, we can do it.

We don't really see that as changing the requirements. We just basically see that as kind of a format change, given the expectation is that all the quality assurance is being performed for the right activities.

So, if we go down then to 58, this is basically the last slide under this section, in terms of design and analysis.

This came out of our interaction with this subcommittee and the need to think about, and possibly develop, both regulatory requirements and guidance related to non-radiological hazards, like exist for UF-6 and fuel cycle facilities, where it's not just a radiological hazard, it's also a toxicity question that we need to think about, especially given some of the reactor designs, including the use of toxic chemicals that might be released, along with a radiological release.

So, the staff is looking at that, looking at what we do for fuel cycle and other licensees. But we haven't made any changes to part 53 and we're still in the investigating phase.

And so, I guess the last one is turning it around and say, if the ACRS has any additional suggestions or references, we're always amenable to hearing about suggestions, because we're just beginning that investigation.

MEMBER KIRCHNER: Bill, this is Walt.

Yeah, on that last bullet, I'm thinking -- I'm not sure this is the correct clinical term, but mixed waste, where you have chemicals, and especially toxic chemicals, mixed with radioactive materials.

I'm trying to think. I'm going to turn to my colleague, Dave Petti, who probably has a handle on this. But I'm trying to think within the DOE system, whether there's guidance that would at least help inform your thinking, if not necessarily be directly applicable.

MEMBER PETTI: There is, but I just can't remember which -- there are a bunch of standards that you could just cite that chemical facilities have to meet for public safety. I just can't remember what the acronym name is right now.

But there's quite a few because of the hazardous stuff that's used in the DOE complex.

MR. RECKLEY: Okay. And we are looking at the DOE standards for a number of areas currently. So, we'll mine that particular body of work to look for it.

Again, I do want to be -- our thinking at this point is, where it's only a chemical hazard, the NRC would not be the lead. But when you're looking at the chemical hazard contributing to a radiological release -- and there's some analogy historically. For example, when chlorine was used for service water systems and so forth, then everybody had analyzed for potential chlorine releases.

So, we'll look at it that way as a hazard to plant operations. And then, we'll also look at it in combination with the radiological risk. So, where maybe the release would involve both the toxicity and the radiological concern.

Since it already involves the radiological that brings us into play, then we would look at the toxicity as well. But I don't want to overstate that the NRC is going to get into the regulation of chemical hazards for the sake of chemical hazards.

So, with that, I guess this last slide is discussion. And I don't know, Dennis, if you wanted to consider this a breakpoint and we'll come back and finish up on the construction and manufacturing.

Again, I think that relatively straightforward.

CHAIRMAN BLEY: Okay. This is a break point. That works perfectly. I'm going to organize these slides in such a way that fits our schedule nicely. Do any members have any further questions on part C on design? Or should we take the break?

We will take a 20 minute break, come back at five after the hour. We are now in recess.

(Whereupon, the above-entitled matter went off the record at 3:43 p.m. and resumed at 4:05 p.m.)

CHAIRMAN BLEY: It's 1405 here, 1605 back east. We are ready to continue with today's meeting. We're back in session. Mr. Reckley, if you would take over we'd appreciate it.

MR. RECKLEY: Okay, thank you, Dennis.

CHAIRMAN BLEY: Thank you.

MR. RECKLEY: So the last topic to go through today, and we touched on this at our last interaction but were a little pressed for time so we thought, we said then that we would revisit it today, and so that's what we would like to do is walkthrough, if we can go to Slide 61.

Subpart E, which is construction and manufacturing. And just kind of going through our typical layout here. If we go to Slide 62 you can see how this fits in.

Again, the overall structure for Part 53 that we were trying to use is the lifecycle that would address, basically, Subparts C through G, with each subpart kind of focusing on how it supports meeting the safety objectives laid out in Subpart B. And so this would the construction and manufacturing phase of the lifecycle.

And if you can go, Liz, down to 63. The subpart is laid out, basically, in two parts. The construction, which is addressing the activities under a construction permit, or a combined license, and is controlling in activity.

The traditional construction of a unit, like has been done for all of the operating plants. And Vogtle 3 and 4 currently under construction.

And Part 2 lays out the manufacturing option. And for this purpose we're calling that the activities that would be done under a manufacturing license.

The NRC has, for many years, had that provision within, first, Part 50 and then Part 52. It's currently Subpart F of Part 52 for manufacturing license. But not exercised it since the initial try for offshore power systems many years ago.

So that's basically the difference. Construction basically being the site activities, including the total construction of a nuclear power station at a site, and manufacturing being the process, kind of a factory setting, for the manufacturing under a manufacturing license.

So if we could go, we'll kind of walk through the whole subpart. 53.600 just sets out the scope. And again, that is those items under a construction permit, combined license, manufacturing license or limited work authorization.

And Slide 65 starts to talk about the construction activities. And we tried in the discussion table, that we released for Subpart E, to say where these activities were coming from or where these requirements were coming from.

By and large, this was an exercise to capture existing requirements. Some of it might have been pulled from specific licenses or guidance, but again, most of it existed. And the discussion table provides a, kind of a roadmap, from where any individual requirement came.

So, 53.610 lays out that before starting construction, an organization has to be established with management and controls setup. Kind of command and control authority assigned, procedures established, a requirement to go and evaluate previous construction experience.

Having in place an emergency plan for the site, fitness for duty requirements for the personnel performing the work that's covered by Part 26, for those doing certain construction activities related to safety significant systems. Making sure that the QA program is in place.

And that radiation protection, information and security, cybersecurity, are all in place, as applicable, before you start construction.

MEMBER BROWN: Bill?

MR. RECKLEY: Yes.

MEMBER BROWN: This is Charlie. Like you said, we hadn't finished this the last time. I take it there has been no second iteration, isn't that right?

This is just --

MR. RECKLEY: Yes.

MEMBER BROWN: -- what we started looking at before?

MR. RECKLEY: Yes, sir. Yes.

MEMBER BROWN: Okay.

MR. RECKLEY: This is still the first iteration. And actually, even the same discussion table. We have not made any changes to anything related to Subpart E.

MEMBER BROWN: Yes. I pulled it back up from the earlier Subcommittee meeting.

MR. RECKLEY: Right.

MEMBER BROWN: And I don't know whether I asked this question before, but why is construction different for an advanced reactor or all this new stuff as opposed to building anything else?

Isn't Part 50 applicable for the most part?

MR. RECKLEY: Well, and again, what I was trying to say is, when you looking at the mapping of these requirements it basically is the same. We were trying, to date anyway, to make Part 53 self-contained and separate from Part 50 and 52.

MEMBER BROWN: That's --

MR. RECKLEY: We do --

MEMBER BROWN: Go ahead. Go ahead. I'm sorry.

MR. RECKLEY: No. We are referring to some parts that, for instance, Part 20. And we, as we go forward, we will be referring to Part 73 for security.

But we didn't want, at least on this first iteration, to be bouncing back and forth between Parts 50 and 53 or 52 and 53. And so, we brought stuff in, even if it was basically the same. And so --

MEMBER BROWN: That's fine. I just, just

copying and pasting it is fine, that's --

MR. RECKLEY: Right.

MEMBER BROWN: -- that's all I was looking for.

MR. RECKLEY: Right.

MEMBER BROWN: And you build stuff in one way, you build it before, you build it the same today, it's just a matter of where you're located.

MR. RECKLEY: Right.

CHAIRMAN BLEY: I'd like to follow on what Charlie just said. And I appreciate that you're putting it there.

Same as with over the last 15 years as we did various design cert meetings, had great trouble reconciling the things that were included in Part 52 and the things that the Staff ended up having to pick up from Part 50. But that wasn't really laid out anywhere so it could be clearly followed, so I think this is a good approach.

And the other rulemaking on reconciling 50 and 52 should make those, should eliminate that problem again.

MEMBER BROWN: Yes, thanks for, I agree with that. I just thought this was the right way to go instead of being confusing. That hit the nail on the head. Thanks for clarifying even more of it, Dennis.

MR. RECKLEY: And it will, I think, is another advantage, is it will be easier to find. Everything related, hopefully everything related to construction will be here.

If we missed anything, as we go through, we'll add it. But it will be here as opposed to kind of needing to look through various requirements for where a construction oriented requirement resides.

So, we can go on to 66, I think. So, management controls, construction activities is the next section. And basically it just is requiring that procedures be in place. It brings in requirements for fresh fuel and fire protection.

Again, citing from where they came. Either from 50.52, or in some cases, from established guidance. The inspection and acceptance of SSCs, just kind of a quality assurance, quality control measure.

And then the requirements that we pulled in relation to communications. With one key element to that being coordination with the NRC, as well as coordination internally within the licensee's organization.

Go on to 67. Basically the manufacturing sections, the initial ones, are much the same. It's management and control, the need to have the design and analysis conform with Subpart C.

For those that haven't looked for a while, basically a manufacturing license combines under one, if you go back to the efforts to improve standardization of nuclear units, and this goes back into the '70s and '80s, led to things like the development, ultimately, of Part 52.

But the way I look at it is that the tools that were laid out kind of go in a hierarchy of standardization. And design certification is, at one point, in that it gets you to the standard design that would be copied from site-to-site.

And a manufacturing license just includes an additional measure of standardization where you go from a design. And you basically introduce that manufacturing technics are also standardized and captured in the license.

And so you would reduce variability, not only in the design, but in the actual putting together of the machine and the way that it is put together.

And so, that is why the first bullet is kind of important, that under a manufacturing license you need to make sure that going forward you have things in place to make sure that the design and analysis conform with Subpart C, which is the design section. And then going forward, that you have organization and procedures and qualifications.

And again, with the distinction being that under a manufacturing license, some of those procedures, if their key aspects of the manufacturing might actually get picked up in the license.

And so, if there is a way to assemble the machine, let's say a particular welding technic and the NRC is going to say, we're going to acknowledge ahead of time that if you do it that way it's acceptable, then that becomes a license condition. And as part of the manufacturing process, part of the manufacturing license that we've pre-approved, the notion is we wouldn't have to continue to look, we can look at the quality control, quality assurance aspects to make sure the welding is done right, but we shouldn't need to revisit whether that welding technic is an acceptable way to do it.

So I see a hand raised?

MEMBER HALNON: Yes, this is Greg. I'm not sure the right place to ask this but if you kind of, through the years we've always had trouble going back into records and finding problems and issues in both manufacturing and construction from the operating perspective.

Is there any special or added emphasis given to the corrective action programs that would transcend through manufacturing, through construction into operations such that it's much easier to trend and find problems that could have been latent, you know, put in there during the processes that we can't see until we actually try to operate this thing?

MR. RECKLEY: That's a good question. I hadn't really thought about what the tools might be. In theory, it should work.

For example, given that this is the highest level of standardization, and basically a factory setting, that should a problem be identified, it's applicability, the scope of the problem, is now easier to track because you basically know that that same process was used for all of the manufactured reactors.

But in terms of, for example, how we would capture this in the equivalent of Part 21, in the reporting requirements and in the need to do corrective actions and so forth, we hadn't written those yet. But there would be something similar to how that would have to work.

And so, hopefully that helps. It's --

MEMBER HALNON: Yes. Future discussion I can see. What I'd like to hold, I guess when we look at the QA requirements, if we just refer to kind of the Part 50, I'm not sure it's going to be adequate for the expectations we put on licensee operating, now I would think construction and manufacturing corrective action programs.

I think the higher emphasis we put use of that and the reliance we put on there for safety it might be a good discussion to talk about what kind of language we may need to ensure that when we get into the operating we can look back as far as we need to find any potentially latent problems that are in the, or active problems that maybe just weren't fixed properly. Given the fact that there is probably dozens and dozens of manufacturers that would be out there building components.

So, maybe a future discussion. I'll keep a note and we can talk about it maybe at a more appropriate time.

MR. RECKLEY: Okay. Yes, that would be great. Thank you.

And to some degree, records management, hopefully, with the technologies that's been introduced, can help in that regard. In comparison to, you know, I'm old enough to say, to go back to design reconstitution days.

You know, hopefully we should never have to do something like that again given the improvements and records management. But --

MEMBER HALNON: Right. Right along with the software systems and whatnot we have.

MR. RECKLEY: Right.

MEMBER HALNON: Clearly in a different era.

MR. RECKLEY: And I'm not following it much more, but this is another area where people are talking about the use of digital twins and things like that, that is a combination of design, operations, information technology that I think people are looking at to try to address, at least in part, the issues you identified.

But there is, there will probably be opportunities for this Subcommittee, or other subcommittees in the ACRS, to hear about those kind of activities from those directly involved on the Staff side.

So, again, many of this would just mirror what we talked about on the construction side. Having an organization and procedures.

We'll have to decide, at some point, to capture in the license itself. And again, we haven't exercised this since offshore power systems, which was a totally different animal.

So we're looking at this kind of with fresh eyes to say, how can manufacturing license really be revised and optimized. But certain things would have to come into play.

Again, fitness for duty. There will be workers doing activities that directly affect the safety of the unit once it's deployed. And so fitness for duty would apply.

Quality assurance would apply. And information security. Cybersecurity might very well. We'll have to see the scope of the manufacturing license, what it is going to entail.

Radiation protection. Especially if it's going to involve fueled reactors, as we're going to talk about in a minute.

Yes, Dennis.

CHAIRMAN BLEY: Yes. This kind of clicked something. By the way, offshore floating plant stuff was almost 50 years ago. It's been a while.

In other area, one thing, it came up with that discussion you had about automating the records and having good records. In almost every, really significant event we've had in LWRs in the last 20 years, maybe longer, probably longer, deficiencies in the corrective action programs at plants, things that fell off the table and got lost and didn't get corrected, ended being major factors in those events.

There's a safe issue, a really effective corrective action program is kind of crucial. And we see that because it does show up when things go bad or wrong.

I don't know how much NRC is involved in overseeing corrective action programs. I'm not real sure of how the Industry has shared information to help everyone have good ones, but I suspect there has been a lot of work in that area.

If you or somebody else could comment on it, I would be interested.

MR. RECKLEY: Well, I'll defer to anybody on the Staff, or actually even on the Subcommittee that might have more experience because it's been a long time, but I know is actually a key area within the inspection program.

So that there dedicated elements of the inspection program that look at licensees, corrective action programs. Their ability to identify and rectify condition reports that are raised by the Staff.

There is likewise areas related to things even like the safety environment and the willingness of people to bring forth problems. That's an area that gets special attention.

Part of the inspection program. And it's taken very seriously if there is any impediments to an employee's willingness to bring forth an issue.

And so, yes, I think it is a major part of the reactor oversight process. You know, at the licensing side we look and make sure the procedures and the things are in place. But then once it goes into operations I think it's a major focus.

But if there is any other staff on the line that has more experience they can certainly weigh in.

CHAIRMAN BLEY: But before they do, I appreciate what you just said. And I guess I knew part of that, but not all of it.

But if we go back a few years to that Robinson fire, one of the problems there was, you didn't have the most knowledgeable people doing the entry work into the corrective action program. So people didn't, the people who entered the action events, and there were several that were related, didn't know the electrical system well enough to understand what they were looking at.

So things got assigned very low priority when they really should have been extremely high priority. And that's the kind of thing I see more often than not.

Or that just people aren't exercising (audio interference) there is a lot of effort, both on the utility side and the inspection side to address that.

The first part of that, I'm not sure. Because if you don't have the right people putting data in you don't get it relayed right.

And maybe somebody from the Industry or somebody on the Committee knows more about that and can say something. But otherwise, I think you should go on.

MR. RECKLEY: Yes, sir. All right. So I think we can go on to 668. Then once you get into manufacturing, Dennis, did you have something else? No, okay.

CHAIRMAN BLEY: I forgot to turn my mic off, sorry.

MR. RECKLEY: Okay. Just the requirements in this subpart to adhere, not only to the applicable codes and standards that might be referenced but to adhere to the manufacturing license itself.

And then we start to get into one of the areas that is different, and different even than our first four 4A into manufacturing license. And you might be right, Dennis, that might have been as long as 50 years ago with offshore power systems.

But that's the notion of loading fuel in a factory setting and then transporting. So to the degree you're going to introduce special nuclear material, you would have to have in place then the security, procedures for the receipt of fuel, additional fire protection measures, emergency planning perhaps. Radiation protection and other procedures that come along with having special nuclear material.

So, since the last discussion with the Subcommittee, we did bring this up at a public meeting, and we also talked to counterparts at the Department of Energy, and field this as, that we've gotten enough feedback that we need to develop this into the scope of activities that would be covered under Part 53. This loading of fuel at the factory.

So, as Charlie mentioned, we had some placeholders and some discussions related to this, but I have a slide coming up where we're going to increase our focus.

So if we can go to Slide 69. The rest of 620, relating to manufacturing, communication, the same as we had before, largely.

Then transportation, and we currently are looking at the interface with Part 71, our transportation regulations. The thing we are continuing, for now anyway, on the first iterate, well, this might be the second iteration of this subpart, but our first real jump into defining the interfaces for transportation.

But what we're keeping from the existing Part 52, Subpart F manufacturing license, is that you would only be able to transfer a manufactured reactor, and this would be true if it's fueled or not, but you would only be able to transport it to a site that has an existing construction permit or combined license.

And we would only be looking at fixed citing. In other words, the next bullet. We're not currently planning for Part 53 to address anything like mobile reactors.

Now, they may be developed and they might actually be available to the Department of Defense for example. But at this time, as we're developing Part 53, we're going to be looking at the manufacturer and the deployment to a fixed site.

The next part is just the requirements that we have for manufacturing license actually. So, it has to have the procedures for acceptance and installation of the manufactured reactor at the site. And it has to, perhaps obviously it has to be inspected and accepted prior to installation.

We are looking now at not only the transport with the fuel from the factory to the site for operation, but also considering possible plans for the transport and the disposal post-operation. And we're looking at how to do that and in what subpart that might be.

We might put it in Subpart G, for decommissioning. Or we could, we'll find a place to put it, but it might depend on the feedback we get from stakeholders as to what models they want us to use as to where we have to put it. And it might show up in multiple subparts.

It could show up in operations. For example, if there is a plan to remove one and bring in another. So that might be reflected in Subpart F under operations. I mentioned it might be in Subpart G, for decommissioning, depending on the model that people want us to reflect.

So we're still somewhat in a data gathering mode.

And looking at the regulations. It's not clear, all of this can be done without changing Part 71. And so, that's currently being assessed. And we would have to make a decision as to whether we can do that as a corresponding change or a future change. So, all of that is being evaluated.

So, if we can go on to Slide 70. It's talking about the issue of loading fuel in the factory setting. And so, we would likely need to revise the manufacturing license provisions.

And we're going to need to do that anyway because, again, they were developed to support that model of offshore power systems and haven't really been updated, significantly, since that time. And that was a different model than a factory kind of setting that we currently envisioned.

For those not familiar, offshore power systems was basically the construction of Westinghouse ice condenser plant on a barge and then floating it to its location from the Florida assembly point to places off the coast. So quite a different model than putting together a micro-reactor in a factory and shipping it for deployment.

So, we'll be updating those provisions and seeking input from the potential, especially the micro-reactor designers, as to how those provisions might be developed.

As I mentioned, the manufacturing license can be referenced in construction permit or combined license.

And one, going back to the statement on standardization, the design cert and the manufacturing license was largely standardization of operating units. And the role of those vehicles, design certs or a manufacturing license, to make all the operating units similar or the same.

And to thereby allow safety assessments to be done for multiple plants by looking at one design. That's going to continue to be a key role for the manufacturing license, in terms of, and that's why the bullet is, it will be referenced in construction permit or combined license applications.

The hope would be that when we issue a manufacturing license we basically are saying, if you follow this set of requirements on its deployment, then it can be deployed. And we've already looked at the safety in terms of the manufacturing license.

So, that's those couple of bullets. That the manufacturing license focus remains to support the operating unit once that manufactured unit is deployed.

However, the next bullet is the twist, which is, when you talk about loading fuel at the factory, for its possible deployment, now within the manufacturing process, the design and the manufacturing process, you are introducing requirements related to safety within the factory.

If you're going to load fuel you need to make sure it does not go inadvertently critical in the factory. Likewise, and the next slide talks about transportation, it includes that wrinkle as well.

So, we're looking that Part 70, for special nuclear material, already includes a fair number of provisions for the handling of special nuclear material and safety that needs to be done, for example, to ensure that you don't have an inadvertent criticality.

But we're looking at assessing how the combination of the manufacturing license, which would maintain a focus for supporting operations, but also goes into the assembly of the reactor in the factory, would be combined with Part 70 to address, again, not only the deployed reactor but the safety of the nuclear reactor in the factory. So, that's a little long-winded but that's the challenge that we're facing.

So a lot of it might be addressed within Part 70 but we'll look to see how much is within Part 70, how much is, maybe we can make up the difference with provisions within the manufacturing license and so forth.

This would also, this may very well --

MEMBER KIRCHNER: Hey, Bill?

MR. RECKLEY: Yes, go ahead.

MEMBER KIRCHNER: This is Walt. Yes, not to make your job more difficult, but one wrinkle I see is that, and I'm not sure that 70 really covers this, 70 certainly addresses criticality prevention and those aspects of the manufacturing facility, but it doesn't address a fully loaded core.

If you look at 10 CFR 50.54 on the requirements for licensed operators, it almost would suggest that when you put that reactor together in the manufacturing plant and load it with fuel, you now essentially have the equivalency of a refueling operation at a commercial operating plant, which requires an SRO qualified licensed operator to be the shift supervisor on the floor for that operation.

So not trying to make it more difficult, but it does beg the question of what, you had earlier things like fitness for duty, but this goes beyond just fitness for duty. This says, do you need a licensed operator, so to speak, or the equivalent when you actually load the fuel in the reactor, seal it up and send it on its way.

Not trying to make things more difficult.

MR. RECKLEY: No, no, no. It's a good observation, and just an extension of what we were thinking. And it's a good point.

And the thinking is, that might be exactly what you have to address within the manufacturing license because it has, it's what's available to you, and it might be the easiest way to do it would be to say, as part of the manufacturing license this is the requirements on the staffing at these stages of the manufacturing.

And if you're loading fuel then the requirements for, not only the monitoring and so forth that might be addressed by Part 70, but also the personnel involved goes up a notch. So whether it's licensed or not we can decide.

But yes, that's exactly what we're talking about in terms of what might we need to add to the manufacturing license and can we do it. I mean, we're still assessing all of this.

Very early discussions, when this notion first came up was, whether the factory would need, basically a construction permit operating license. So we're thinking right now, but a lot of assessment to be done, that we can do that within the provisions of the manufacturing license.

But a lot of thought needs to be done because it's a new, for us reactor people it's fairly new. For people involved in the Military side it may not be as new, but that goes beyond my experience.

So that's the factory conditions. And then on 71 you also introduce challenges in the transportation because now you have a loaded reactor. And in combination with the reactor design and whatever over pack or other shipping container is going to be provided, it needs to meet the requirements of Part 71.

It will be from both the safety and the security side. As I had mentioned, we're at both the front end shipment from the factory to the site.

To the degree that includes fresh fuel, that might be simpler. But there are even proposals down the road maybe that wouldn't be first units, but down the road and therefore maybe something we need to address in the rule that it wouldn't be fresh fuel it would be recycled fuel. And whether that makes a difference or not we haven't thought through.

And then also, as I mentioned, questions related to the transport of the fueled reactor, from the site to either the factory for processing, to a recycling facility or to a waste facility. So all of that has to be thought about. And right now we just kind of have a placeholder in here for how those interactions would go.

And we need to talk more with counterparts and NMSS to see what the current regulations would address and what potential changes might be necessary, to even Part 71, to support either end of that shipment. From factory to site or from site to the ultimate destination of the reactor once it's gone through its operating cycle.

MEMBER REMPE: So, Bill, in thinking about that, and what's happen with our current operating fleet, what happens if there is no place to ship it back to, are we going to have ISFSIs on the site, discarded units?

I mean, it might be good to explore that with DOE and the folks who are proposing to do this since we still don't even have a waste facility for our current fleets fuel. Did I disconnect or can people hear me?

CHAIRMAN BLEY: No, but I don't hear Bill though.

MR. RECKLEY: Oh, sorry.

MEMBER REMPE: It's okay.

MR. RECKLEY: Sorry, I pushed the mute button. Excellent point, Joy.

Yes, we'll have to add storage, potential storage, to the equation. So we will add that. And talk to both the community, as to how they see that going, DOE. And also to our folks in NMSS about how that would go in terms of, like you say, whether they need a provision for an ISFSI license or how that might work.

Some of the designers are giving this at least a little bit of thought because some of them already have, like the molten salts, they already have hold times built in for taking out a module, setting it aside for years to let the activity go down. But we'll certainly bring this up.

CHAIRMAN BLEY: Yes, Bill?

MR. RECKLEY: Yes, Dennis.

CHAIRMAN BLEY: Many years ago, like at the time of the TMI accident, the Navy was not willing to share their experiences with the NRC and the Industry. Has that changed?

Is there any interaction with the Navy's nuclear programming now or is it still, they don't really share? Except for in approving a new design.

MR. RECKLEY: That's, go ahead. If somebody else is going to answer please do.

I know we're working in terms of the development with DoD on the development of the micro-reactors. I don't have any experience with the Navy designs or other interactions, to be honest, Dennis.

If any other Staff do, feel free to unmute and weigh in.

CHAIRMAN BLEY: My thought was, they may have some experience on the transportation issues that could be helpful.

MR. RECKLEY: Well --

CHAIRMAN BLEY: I don't think they're sharing.

MR. RECKLEY: I will say that at the last public meeting that we had on this topic, and a discussion related to this, that one of the presentations was given by BWXT, which is doing some of that work for the Navy, right, and so we did at least hear from the vendor side of that on their experience and their thought.

And they are also related, or involved, with the broader DoD micro-reactor project. And so I think that will be an opportunity to bring in that experience, which I think will be very valuable to us.

CHAIRMAN BLEY: Okay, thanks.

MR. RECKLEY: Okay. So I think we can go on then to Slide 72, which is the discussion.

If any on construction and manufacturing, again, largely taking from existing requirements related to those activities, consolidating it into those subpart. And really, the only new areas we see are updating the manufacturing license provisions that are currently in Subpart F of Part 52.

And this challenge that we've been talking about for the last few minutes of when you start to talk about loading fuel in the factory and doing possible transportation that that's basically a new area for us that we would need to look at in terms of the manufacturing license and the regulations in Part 70 and 71. And others. But primarily Part 70 and 71.

So, with that I'll open it up and see if we have any questions.

MEMBER PETTI: Bill, my only thought on some of this is, HEU is shipped around the country for a variety of reasons, including a couple of the test reactors that we have out there. And so, criticality control and some of those things there, there may be some useful information there on how those things are managed from a regulatory perspective.

MR. RECKLEY: Okay, yes, thank you. And that was the observation from the BWXT down there as well.

MEMBER PETTI: Yes. And just a question in terms of this manufacturing license. How much of the licenses that the fuel vendors have currently is applicable or useful as sort of a starting point? Do you know?

MR. RECKLEY: I mean, we're looking at Part 70 in the fuel cycle facilities, in the safety program, for example, that they have. And some of that may be, well, I think it is likely useful.

And maybe it makes more sense to adopt that kind of system then what the reactor side would be more oriented towards.

But again, we're just beginning now to

look at that and to make the judgments as to which way to go. So it's a good --

MEMBER PETTI: Yes.

MR. RECKLEY: -- good suggestion. Since they're already licensed under Part 70.

MEMBER PETTI: Right.

MR. RECKLEY: Right.

CHAIRMAN BLEY: Bill, I think you're planning to share us Slide 74, which we'll want to see. And I also suggest moving towards Slide 79 before you wrap things up.

MR. RECKLEY: Okay. So, yes, if there is nothing else on the manufacturing.

So this does get into our schedule in where we are currently. Our goal is to send, to have this wrapped up by basically a year from now. So if you go back to the slide we showed earlier on the different subparts and when we plan to come before the ACRS and public stakeholders and so forth. We were trying to do a staircase where we're introducing these and having the package together by the summer.

We would still be looking to have that wrapped up, largely, by the end of the year so we could meet with the ACRS and you could assess and make your recommendations to the Commission based on a full committee meeting in early 2022. And so, so that we can support getting the proposed rule package to the Commission by May of 2022.

And all of this, following that, is the comment periods and the resolution to comments and the going back up with a final rule package to the Commission in March of 2024 to meet the scheduled goal established by the Commission, to have this done by October of 2024.

But just looking at the next steps and focusing on those, that was that staircase figure where, again, we would hope to have most of the preliminary language prepared by the summer time. There might be areas like staffing that go into the fall, but to have all of that together, basically by late summer, early fall, to also work in the licensing part, Subparts H and I.

And we have to write all of the other parts of the rulemaking package. The statement of consideration and all of that. To have all of that done by basically the end of the year to support the subcommittee meetings and a full committee meeting in early 2022.

CHAIRMAN BLEY: All right. I know you can't say you won't meet that schedule. It's a massive amount of work you have to get done.

The law itself gave you another two or three years, right? But you have direction to finish by that time.

MR. RECKLEY: Yes. And NEIMA's schedule was 2027. And the Commission set forth a goal for us to have it done earlier than that. And that's what we're working towards.

There is both external, internal and internal discussions on the schedule, our ability to meet it. Personally I think the Commission's wisdom in this was, if we laid out a schedule for 2027 we would be done in 2030.

So, if we lay out a schedule by 2024 we at least have some margin. We can do our best to meet that schedule, but we have an ability to maybe a slip a schedule a bit and still meet the law. But you're right, it's an aggressive schedule.

(Laughter.)

CHAIRMAN BLEY: Okay.

MR. RECKLEY: So, yes, if we want to then go on. Some abbreviations. Which was the other one that you thought, Dennis? Oh.

CHAIRMAN BLEY: That one.

MR. RECKLEY: Yes.

(Laughter.)

MR. RECKLEY: Yes. We are here. And you can see we're still developing it. This just goes to what I was saying that we hope to finalize the drafted proposed rule and have it to the Commission. So the first right turn there would be that May 2022 date.

CHAIRMAN BLEY: I think the part that, well, there is lots of parts that are hard to see, hard to get there, but you're making great progress in this last round. At least to me help a lot in two or three areas. Subpart D, I understand it for the first time.

And the approach to allowing something, unless we'll kind of pull down BRA, I think is really kind of important to (audio interference) I was leading to a question.

I guess the part I'm really uncertain about is, how much of the guidance you can get pulled together by the end date?

And for me, that's really important because having a real kind of general gives you a lot of flexibility, but without enough guidance to clearly understand where you are headed it's kind of hard to be fully onboard.

Are you actually beginning to write some of the, will end up in statements of consideration or is that still later down the road?

MR. RECKLEY: We're thinking about it. I don't think we've put pen to paper yet.

I mean, as we go through this process we're, I can't point to a document that says statement of consideration, but we have a lot of text, a lot of discussion that we have captured. We have a lot of the comments and what we've thought about them that will roll into that document.

So, I don't want to say we're absolutely not started, but to be quite honest, I don't have a document yet that says statement of considerations.

CHAIRMAN BLEY: I get that. The status, and I think you said we'll talk about next month on the human system considerations, simply that that might be part of such. Or at least, some of that might be part of such a document eventually.

Am I misleading that a new document will come out next month?

MR. RECKLEY: No. Yes, I forget whether that's next month or June, the meeting, but that's a critical part of Part 53.

As you know I guess, you know, one of the goals of the Advanced Reactor Program, and this doesn't affect NRC directly, it's not our job, but as the designers and Department of Energy and others look at the feasibility of nuclear feeding into the future energy supply mix, you know, cost is a factor and a significant cost in the O&M space is staffing, and so that's the push from the design, the industry side.

And, by the way, that's also, you know, that was a goal of the Advanced Reactor Policy Statement that basically says part of the desire is for the strength of the design to lessen the reliance on the human interaction and thereby let the staffing levels go down.

That wasn't part of the policy statement, but reading between the lines. And so, you know, we will need to do it, and I am agreeing with you, that is a key part because the safety, ultimate safety of the unit is the combination of the machine, the people, and the programs that are put in place.

And so we have talked a lot about the hardware. This next discussion is going to talk about the people. The White Paper laid out kind of what the issues are and talked about some of the possible directions we would go, but didn't really -- I mean it just kind of identified the challenge.

It really didn't go very far in actually coming to conclusions. So that is the challenge that we will need to do and that is a key guidance document to prepare. It will also be one of the biggest challenges to try to have anything complete by May of 2022, but I think we can be well along by May of 2022.

Whether we have a draft regulatory guide to accompany the rule or not, or the proposed rule, I am not sure, but we will be able to describe where we are with interactions with stakeholders and where the guidance document is and where it is headed.

MEMBER KIRCHNER: Bill, this is Walt. Your comments prompted me to remember, I don't have it in front of me, unfortunately, the Advanced Reactor Policy Statement, but one of the things that feeds into your comments just now is the emphasis on prevention rather than mitigation.

The implication being mitigation whether it's programmatic or operational requires people and such. So I am trying to think now. I will go back and look at this section that you have shared with us today whether that prevention emphasis actually comes through in the design safety criteria and functions.

But I remember that distinctly as part of the Advanced Policy Statement, less emphasis on operators in particular as well as programmatic controls.

MR. RECKLEY: Yes. And it may be subtle, but for example it goes back to the importance of the one section on trading analytical margin for operating flexibility, right, because that is where the designer is able to say this is what we have accomplished in the design, this is how we have kept the doses, the consequences low, this is how we have controlled the frequency of such events within the design, and, therefore, these are the operating flexibilities we think we have justified, and that can be programmatic areas like emergency planning. We also expect it to be in areas like staffing.

And other places where it is, by the way, is also the design choices they make, for example using Passive, that is also encouraged in the policy statement and thereby gets you out of reliance on diesel generators and then cooling systems for the diesel generators and the kind of cascading of the technical requirements and then all that goes along with that by using the traditional active systems.

So it's all, you know, it's all an integrated one big goal within the policy statement to move to more Passive, to simpler designs, with the attributes that are identified in the policy statement and from that to get the benefits that we have been talking about.

So, but it goes I guess to reinforce the importance of that one section within the design and analysis subpart on how to take the design attributes and trade it for what we are calling operational flexibilities. That's all.

MEMBER KIRCHNER: Well a different approach as someone who would think of this as a designer is that I wouldn't relax the quality assurance requirements one bit, but I would try and design my system that such that the number of structure systems and components that are classified as safety related are substantially reduced and there is a huge economic benefit to be reaped in that.

And so that's a different take on that section that you have on trading it just for operational considerations.

MR. RECKLEY: Right. And if you have in interest in that particular exercise the White Papers that are associated, these aren't the, they aren't directly related to NEI 18-04. I am saying it wrong. They weren't reviewed and endorsed by the NRC, but they were the White Papers that led to NEI 18-04.

They were very similar to White Papers

that were prepared for NGNP, but it lays out how that process, and this is, again, this is from the designer's standpoint so it's not an area where the NRC focused, but from the designer's perspective how that process that they laid out for NGNP and then got reflected in the White Papers related to NEI 18-04, specifically go through that exercise to say how can we pick the safety-related systems to minimize their number while also delivering the safety results.

And so that is something that those sets of designers and the Department of Energy gave a fair amount of thought to to achieve exactly what you are saying, Walt.

Any other questions?

CHAIRMAN BLEY: Members?

(No audible response.)

CHAIRMAN BLEY: Well, I think this is the end of what you have to present, right, Bill?

MR. RECKLEY: Yes, it is.

CHAIRMAN BLEY: You've done such a good job. We have missed hearing from Nan and we regret that, but thanks.

Now at this point we had a request from U.S. Nuclear Industry Council, the NIC, to make some comments and I will turn to Cyril Draffin again. Mr.

Draffin, you were with us last month I think and please go ahead.

MR. DRAFFIN: Thank you very much. Yes, it's Cyril Draffin. I am the Senior Fellow for Advanced Nuclear at the U.S. Nuclear Industry Council.

Although it is difficult for us to evaluate the rule absent all the language, which we know will be forthcoming by the end of the summer, our comments will address some of the key issues strictly for Subpart B and C.

We have a number of them. First, on the Adequate Protection Standard we disagree with the second revision of the strategic objectives that dropped the reasonable assurance of Adequate Protection Standard.

USNIC thinks that the adequate protection of public health and safety is important and changing the objectives primarily to justify the preliminary language seems questionable.

Regarding Tier 1 and Tier 2, we think they are still confusing with opportunities for unintended consequences. The second revision of the strategic objective drops the language from the Atomic Energy Act, so a Tier 1 and Tier 2 distinction seems less relevant and maybe a single tier should be considered unless the operations language, which we haven't seen yet, shows real benefits.

Third point, flexible and predictable. We think Part 53 rule can have predictability as well as flexibility. Predictability is having specific performance criteria that must be demonstrated and every applicant must show they meet those criteria that forms the basis for the staff findings of safety.

Flexibility is the means to do so, the means of demonstrating the safety criteria met, and needs to be a function of the technology. Establishing a prescriptive process in the rule, such as just trying to implement LNP, does not recognize a diversity within the advanced reactor community nor the innovation that can occur.

Regarding including deterministic and probabilistic approaches USNIC believes that Part 53 should be to be technology inclusive needs to allow both risk-based and deterministic-based analyses.

To be transformative and technology inclusive Part 53 should not be limited to applications that use the probabilistic risk analysis tool with the idea that microreactors should use Part 50 because 53 won't be appropriate for them.

The second iteration of 53.450(a) is too restrictive in requiring a PRA, and that has been discussed today. It does not allow other analyses even if PRA was used just for confirmation.

A more risk-inclusive language that is found in the second iteration of 53.450(b) is more appropriate. It allows IAEA, the Canadian Nuclear Safety Commission, and other risk-informed approaches, so I think that language is appropriate and ought to be considered for (a) as well as (b).

In terms of PRAs we think they should apply for a range of licensing paths and technologies. PRA insights are what are important, not the specific numerical results.

We don't believe the PRA should be elevated to a compliance tool as part of the application, especially for a construction permit. It's not that clear that the approaches used by Oklo or NuScale would comport with the prescriptive use of PRA as a compliance tool.

If requirement for PRA is included in Part 53 exemptions will be required for some technologies which seems inconsistent with the objectives of Part 53.

The timing for, use of phase or a simplified approach, and the quality of PRA for reigns of licensing paths and technologies merits further discussion.

I will touch on a few other points and then a concluding remark. You have heard earlier today that stakeholders still believe that ALARA is an important concept and certainly a good practice that we expect to continue, but we do not believe ALARA should now be included in Part 53 for a regulation in part because of the subjectivity and complexity to ALARA particularly in the design phase. ALARA was more of a practice for worker protection rather than design in a regulation.

Normal operations, we think they should be for protection of plant workers and not include it in safety criteria. And for Defense in Depth we think it's important as a design philosophy and in supporting adequate safety case, but the Defense in Depth details should be described in guidance not regulation.

So as a final comment, the NRC has stressed in current meetings, including today, that the Part 53 preliminary language will remain open to change until all Part 53 subparts have been provided and stakeholder comments have been received and we do not agree with the second iteration of Subpart B and

C.

Therefore, it may be premature and have negative impacts for the ACRS to submit a definitive letter to support the current drafts of the rule recognizing only a portion of the Part 53 language that's available and the current language is likely to change.

Thank you for the opportunity to provide that perspective.

CHAIRMAN BLEY: Thanks very much. The last time I think you forwarded us a copy, a written copy of your comments. Are you planning to do that again?

MR. DRAFFIN: I can do so, yes.

CHAIRMAN BLEY: That would be helpful because we will be talking about this next week and I'm not sure we'll get the transcript back in time. Thank you.

Are there any other comments from people on the line or in the meeting? If so please state your name and affiliation. I guess I should have asked Derek to get the phone line open, but --

MR. WIDMAYER: The phone bridge is open for public comment.

CHAIRMAN BLEY: It's open, okay. Anybody

who would like to make a comment please identify yourself and make your comment.

MS. FIELDS: Yes, I have comments. This is Sarah Fields. I am with Uranium Watch in Southeastern Utah.

A couple of things, regarding the manufacturing license the regulations do not consider foreign manufacturing of advanced reactors and shipment to the U.S.

I know that NuScale, which plans to manufacture small modular reactor units, plans to have some of those units manufactured in foreign nations, so the NRC is going to have to explain how they are going to assure that foreign manufacturing meets the same standards as domestic manufacturing.

Also, the NRC, ACRS, Department of Energy, and industry do not seem to consider the fact that additional irradiated fuel will be produced and there is still no permanent repository for the long-term care and control of that fuel.

There are currently no plans for such a repository. Apparently this is something that the NRC, DOE, and the industry is going to let future generations solve. I know in my lifetime and probably in your lifetimes there will be no permanent repository for spent nuclear fuel.

I also believe that there will never be a deep geological repository in the U.S. and the NRC, Department of Energy, and industry and communities are going to have to develop another plan. I think any community where a deep geologic repository is to be sited will oppose that.

So continuing to create irradiated nuclear fuel that must be put in permanent long-term care and storage without such a site is ridiculous and irresponsible. This is despite all the assurances by the Department of Energy and the NRC that such will be created in the future.

I think that is stupid and I think you all know that is stupid. So continuing to create this, expand the nuclear industry by you so call advanced reactors is not a very wise decision. Thank you for this opportunity to comment.

CHAIRMAN BLEY: Thank you for your comments. Anyone else care to make a comment?

(No audible response.)

CHAIRMAN BLEY: I think we can close the public line. We are going to have a meeting next week to deliberate on whether we will have a letter and what it will say in July, I'm sorry, in May.

Most of our conversations among the Members can probably wait until that time, but if any Members have anything you would like to get on the record today, please, I'll be looking for that in just a second.

I would also ask all the Members and our consultants if they can send me at least a bulleted list of things you would like to see discussed in the letter that would be helpful.

I have already sent something out to you about the structure of that meeting and how we are going to work and I'll be sending a catalog of issues from the transcripts and from any notes that you send me as discussion points for the meeting.

So at this time, Members, anything any of you would like to say today? Oh, Vesna. Vicki, I see some hands --

(Simultaneous speaking.)

MEMBER DIMITRIJEVIC: Yes. Well, I don't know whether I go first or Vicki who I was --

(Simultaneous speaking.)

MEMBER BIER: You can go first, Vesna.

(Simultaneous speaking.)

MEMBER DIMITRIJEVIC: First, all right. So I just want to summarize and bring one point which

I didn't bring before. I wanted to summarize something which I tried to say through the discussion.

One of the very important thing for me around with the finding use of PRA is that we should be fine. What is the -- What do we gain by using the PRA in the regulation?

So that would actually use of the PRA or what PRA improved the current regulation. And this is how I visualized, this is just my opinion, is we define all the elements and everything the PRA inputs will add the value, for example, design selection license basis events.

Same thing for specification, inputs to DRAP, the staffing, exclusions on, you know, the emergency planning zone, Defense in Depth illustration.

And then for each of these and maybe a few more, so I had like ten or something, so for each of those PRA insights we can just define what type of the PRA input is necessary for that and in my opinion for all of those we can get the partial PRA inputs which combines the PRA designs and qualitative insights and models and we can provide the inputs to those applications.

So this is one of the ways how I would

look like when we had to define how much the PRA, what the level of the PRA we need for the application. The other thing which I already commented, the QHOs and the how, it is my opinion that QHOs shouldn't be used.

You already have the safety goals defined as a Tier 1 safety goals which are based on the, you know, the 45 rem and, you know, the exclusionary boundary on the low population zones.

So they can be modified but those two safety objectives or safety goals are good enough. There is no need really to extend them to QHOs because, well, we already know how much uncertainty we will have in the Level 1 because, you know, we have a totally new design, we don't have experience, we don't a have the data, we don't have too much about the Passive system that we could point out.

The thing is that when we move from Level 1 to Level 2 PRA the uncertainties just grow. When we come to the Level 3 PRA uncertainties are so big, you know, because of what the health impacts would be or the number of fatalities we will have with the different zones dependent on so many factors, you know, where the wind blows, action, what is the population, all the uncertainties there.

And every number in regulation has to be mean value. It cannot be point estimate. So just even with the distribution coming with this mean value coming with Level 3 PRA I cannot imagine that.

So this is why I think that the safety goal that is there should be simple and limited to something which can be reasonably estimated. This is basically what I wanted to add.

MEMBER BIER: Okay. I guess I can go next.

CHAIRMAN BLEY: I'm sorry, my mic just turned off when I was talking.

MEMBER BIER: Oh.

CHAIRMAN BLEY: First I wanted to say something to Vesna.

MEMBER BIER: Yes, right.

CHAIRMAN BLEY: I'm not sure we're going to get the transcript back in time for me to go through it before our discussion session, so if you can send me a kind of bullet list of the points you made that would be very helpful because my notetaking isn't --

(Simultaneous speaking.)

MEMBER DIMITRIJEVIC: Yes. I sent a couple of comments maybe before through this. I am just trying to organize them, all of them, and you just proposed some form today, so I will just look, you know, how I can put all these comments in the form which will be easier for use.

CHAIRMAN BLEY: Okay. Vicki, why don't you go ahead.

MEMBER BIER: Yes. Your line for next week that talks about kind of pluses and minuses, what we liked and what we didn't like, you know, I am coming late into this process but one thing that we should probably say we like if we haven't already, or at least that I like, the whole theory of regulation kind of talks about how being more flexible and more performance based in how you meet the regulation can really encourage innovation.

And here I mean I think the innovation is coming first and the regulation is kind of lagging behind a little bit, but I think, you know, when you look at the enormous range of different possible designs that people have been talking about it seems pretty clear that we are going to have, you know, a lot of innovation coming forward in the future and that it's great that the agency is getting ready for that.

CHAIRMAN BLEY: Thank you. Any other Members?

(No audible response.)

CHAIRMAN BLEY: Well, at this time I would really like to thank Bill Reckley. Your knowledge of what is going into Part 53 is encyclopedic, including the knowledge of what went into developing regulations many years ago and, you know, I think we all appreciate that and your willingness to listen and to make modifications is very good, so our compliments to you and to the Staff for all the work that has been done.

We look forward to seeing how this progresses and we'll see what kind of ideas we have that we want to share with you eventually. So, thanks very much.

At this point I will adjourn this meeting. We are adjourned.

(Whereupon, the above-entitled matter went off the record at 5:31 p.m.)

# U.S. Nuclear Industry Council (USNIC) Comments
# NRC Advisory Committee on Reactor Safeguards (ACRS)
# Future Plant Designs Subcommittee Meeting
# Preliminary Rule 10 CFR Part 53

**22 April 2021**

I am Cyril Draffin, Senior Fellow for Advanced Nuclear at the U.S. Nuclear Industry Council (USNIC). Although it is difficult for USNIC to evaluate the rule absent all the language, which we understand will available by the end of the summer, our comments will address some key issues for Subparts B & C.

**<u>Adequate Protection Standard</u>**

We **disagree** with the 2nd revision of the Strategic Objectives that dropped the reasonable assurance of adequate protection standard. USNIC thinks adequate protection of public health and safety is important, and changing objectives primarily to justify preliminary language seems questionable.

**<u>Tier 1 and 2</u>**

We still think Tier 1 and Tier 2 is confusing, with opportunities for unintended consequences. The 2nd revision of the Strategic Objective drops language from the Atomic Energy Act, so the Tier 1 and Tier 2 distinction seems less relevant. A single tier should be considered unless operations language shows real benefits.

**<u>Flexible and Predictable</u>**

Part 53 rule can have predictability, as well as flexibility.

> Predictability is having specific performance criteria that must be demonstrated, and every applicant must show that they meet the criteria that forms the basis for the staff findings of safety.
>
> Flexibility is in the means of demonstrating the safety criteria are met, and needs to be a function of the technology. Establishing a prescriptive process in the rule (such as focusing on implementing just LMP) does not recognize the diversity within the advanced reactor community, or innovation that can occur.

**<u>Inclusion of options for both deterministic and probabilistic approaches</u>**

USNIC believes that for Part 53 to be technology-inclusive, it needs to allow **both** risk-based and deterministic based analysis. To be transformative and technology-inclusive, Part 53 should **not** be limited to applications that use the Probabilistic Risk Analysis (PRA) tool, with an idea that microreactors should use Part 50 because Part 53 will not be appropriate for them.

The second iteration of 53.450 (a) is **too restrictive in requiring a PRA**. It does not allow another analyses, even if PRA was used for confirmation. The more inclusive risk-informed language in second iteration of 53.450 **(b),** [“*The PRA, other generally accepted risk-informed approach for systematically* *evaluating engineered systems, or combination thereof must be used"]* is more appropriate in allowing IAEA, Canadian Nuclear Safety Commission, or other risk-informed approaches and should be used in 53.450 (a).

**PRA for a range of licensing paths and technologies**

PRA **insights** are what are important, **not** specific **numerical** results. We don't believe "the PRA" should be elevated to a compliance tool as part of the application, especially for a **construction** permit. It's not clear that the approaches used by Oklo and NuScale would comport with a prescriptive use of PRA as a compliance tool. If requirement for PRA is included in Part 53, exemptions will be required for some technologies-- which seems inconsistent with objectives for Part 53.

Timing for, use of **phased or simplified approach**, and quality of PRA for a range of licensing paths and technologies merits further discussion.

**ALARA**

Many stakeholders believe ALARA is an important concept and certainly good practice that we expect to continue. But we do **not** believe ALARA should be included in Part 53 formal regulation, in part because of the subjectivity and complexity to ALARA in the design phase. ALARA is more a practice for worker protection.

**Normal Operations**

Normal operations should be like protection of plant workers and **not** be in included in safety criteria.

**Defense in Depth (DID)**

Defense in Depth is important as a design philosophy in supporting an adequate safety case. But DID details should be described in guidance, not regulation.

**Premature to make definitive comments**

As a final comment, NRC has stressed in current meetings (at ACRS meeting today and 8 April 2021 Part 53 public meeting) that Part 53 preliminary language will remain open to change until all Part 53 Subparts have been provided and Stakeholder comments have been received. And we do not agree with 2$^{nd}$ iteration of Subpart B & C.

Therefore it may be premature, and have negative impacts, for ACRS to submit a definitive letter to support current drafts of the rule, recognizing only a portion of Part 53 language is available and current language is likely to change.

U.S.NRC

United States Nuclear Regulatory Commission

*Protecting People and the Environment*

Advisory Committee on Reactor Safeguards (ACRS)
Future Plant Designs Subcommittee

# 10 CFR Part 53
# "Licensing and Regulation of Advanced Nuclear Reactors"

## Revisions to Previously Released Preliminary Proposed Rule Language & Subpart E Preliminary Proposed Rule Language

April 22, 2021

# Agenda

| | |
|---|---|
| **9:30 am – 9:35 am** | Opening Remarks |
| **9:35 am – 9:40 am** | Staff Introduction |
| **9:40 am – 11:30 am** | Subpart B – Technology-Inclusive Safety Requirements – $2^{nd}$ Iteration |
| **11:30 am – 1:00 pm** | Subpart C – Design and Analysis Requirements – $2^{nd}$ Iteration |
| **1:00 pm – 2:00 pm** | Lunch |
| **2:00 pm – 3:00 pm** | Subpart C – Design and Analysis Requirements – $2^{nd}$ Iteration (continued) |
| **3:00 pm – 5:30 pm** | Subpart E – Construction and Manufacturing Requirements |
| **5:30 pm – 6:00 pm** | Discussion |

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# NRC Staff Engagement Plan

## ACRS Interactions

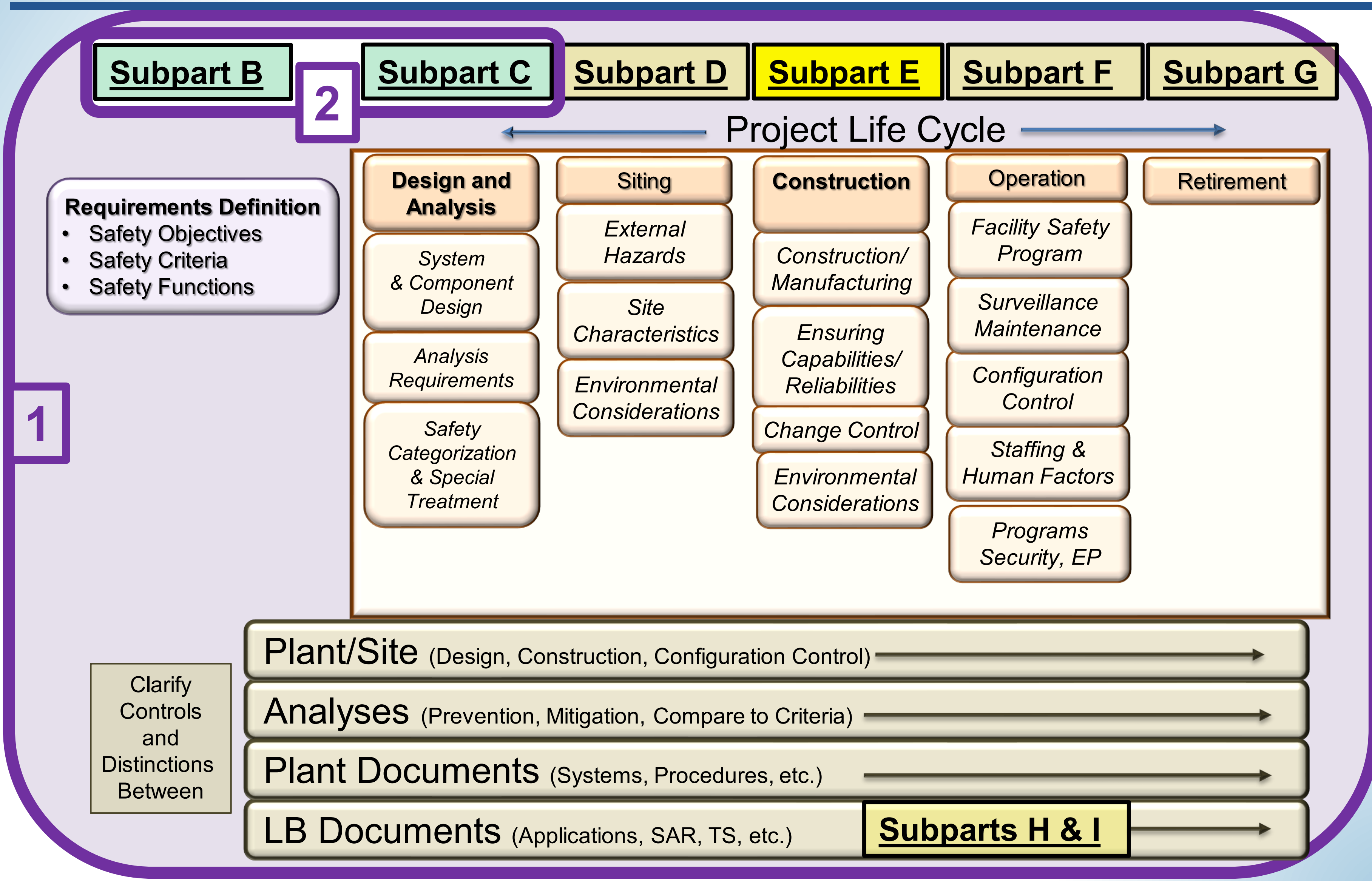
| | Framework | Safety Criteria | Design | Siting | Construction | Operations | Decommissioning | Licensing | General/Admin |
|---|---|---|---|---|---|---|---|---|---|
| Sept 20 | | | | | | | | | |
| Nov 20 | | | | | | | | | |
| Dec 20 | | | | | | | | | |
| Jan 21 | | | | | | | | | |
| Feb 21 | | | | | | | | | |
| Mar 21 | | | | | | | | | |
| Apr 21 | ✓ | ✓ | ✓ | | ✓ | | | | |
| May 21 | | | | | | | | | |
| Jun 21 | | | | | | | | | |
| Jul 21 | Consolidated Technical Sections | | | | | | | | |
| Aug 21 | Consolidated Technical Sections | | | | | | | | |
| Sept 21 | | | | | | | | | |
| Oct 21 | | | | | | | | | |
| Nov 21 | Consolidated Rulemaking Package | | | | | | | | |
| Dec 21 | | | | | | | | | |
| Jan 22 | ACRS Full Committee | | | | | | | | |
| Feb 22 | | | | | | | | | |
| Mar 22 | | | | | | | | | |
| Apr 22 | | | | | | | | | |
| May 22 | **Draft Proposed Rulemaking Package to the Commission** | | | | | | | | |
| Jun 22 | | | | | | | | | |
| Jul 22 | | | | | | | | | |
| Aug 22 | | | | | | | | | |
| Sept 22 | | | | | | | | | |
| Oct 22 | | | | | | | | | |

| | |
|---|---|
| | Concept/Introduction |
| | Discussion |
| | Interim Staff Resolution |

# Proposed Focus (Full Committee/Letter)

- Overall Structure (Framework)
- 2nd Iteration Preliminary Proposed Rule Language – Subpart B (Safety Criteria)
- 2nd Iteration Preliminary Proposed Rule Language – Subpart C (Design and Analysis)
- Challenges and Recommendations

# NRC Staff Plan to Develop Part 53

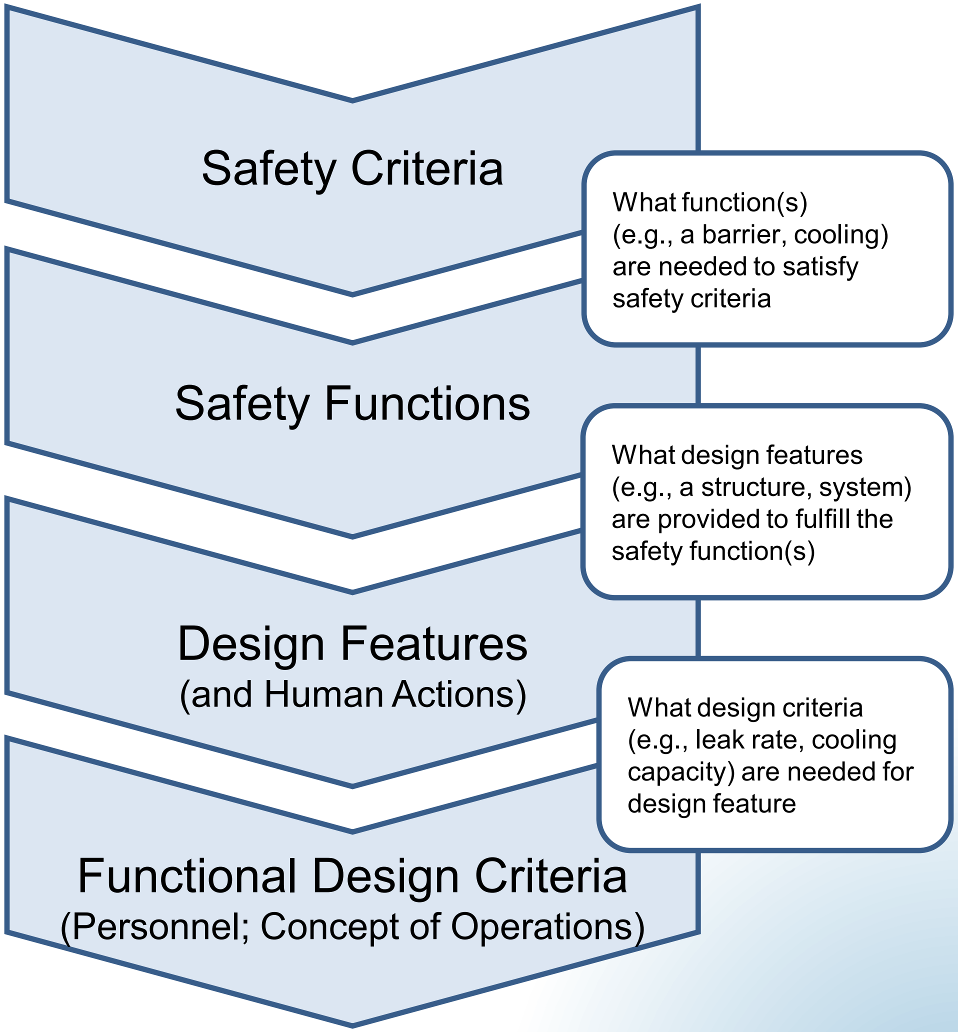


# Subpart A – General Provisions

- Scope
- **Definitions**
- Interpretations
- Written Communications
- Employee Protection
- Completeness and Accuracy of Information
- Specific Exemptions
- Deliberate Misconduct
- Combining licenses; elimination of repetition
- Jurisdictional Limits
- Attacks and Destructive Acts
- Information Collection Requirements: Office of Management and Budget Approval

# Subpart B – Safety Criteria

- Safety Objectives
- First Tier Safety Criteria
- Second Tier Safety Criteria
- Safety Functions
- Licensing Basis Events (LBEs)
- Defense in Depth
- Protection of Plant Workers



# Subpart C – Design and Analysis

- Design Features
- Functional Design Criteria for First Tier Safety Criteria
- Functional Design Criteria for Second Tier Safety Criteria
- Functional Design Criteria for Protection of Plant Workers
- Design Requirements
- Analysis Requirements
- Safety Categorization and Special Treatment
- Application of Analytical Safety Margins to Operational Flexibilities
- Design Control Quality Assurance
- Design and Analyses Interfaces

# Subpart D – Siting

- General Siting
- External Hazards
- Site Characteristics
- Population-Related Considerations
- Siting Interfaces
- Environmental Considerations

# Subpart E – Construction and Manufacturing

- Scope and Purpose
- Part 1 – Construction
  - (a) Management and Control
  - (b) Construction Activities
  - (c) Inspection and Acceptance
  - (d) Communication
- Part 2 – Manufacturing
  - (a) Management and Control
  - (b) Manufacturing Activities
  - (c) Fuel Loading
  - (d) Communication
  - (e) Transportation
  - (f) Acceptance and Installation at the Site

# Subpart F – Operations

- (1) Maintaining Capabilities/Reliabilities of Safety Related and Safety Significant Equipment

    - Operational Objectives
    - Transition from Construction/Manufacturing to Operation
    - Configuration Management for Safety-Related Design Functions
        - Technical Specifications
    - Configuration Management for Safety-Significant Design Functions
        - Special Treatment (e.g., Reliability Assurance)
    - Maintenance, Repair and Inspection Programs
    - Quality Assurance (QA)
    - Design Control

# Subpart F – Operations, Cont'd.

- <u>(2) Establishing and Maintaining Appropriate Staffing</u>
  - Concept for Operations
    - Identifying Role of Personnel in Meeting First Tier Safety Criteria
    - Identifying Role of Personnel in Meeting Second Tier Safety Criteria
  - Requirements for Licensed Personnel
    - Staffing
    - Training
    - Medical Requirements
    - Licensing (Applications, Examinations, Licenses)
  - Requirements for Non-Licensed Personnel (Graded based on roles)
    - Staffing
    - Training
    - Other Requirements

- See NRC staff white paper "Risk-Informed and Performance-Based Human-System Considerations for Advanced Reactors," (ADAMS accession no. ML21069A003; March 2021) for background information on this topic.

# Subpart F – Operations, Cont'd.

- (3) Programs
  - General Requirement to Develop Needed Programs
  - Radiation Protection
  - Emergency Preparedness
  - Security (Physical, Cyber, etc.)
  - QA
  - Integrity Assessment (Aging, Fatigue, Environmental)
  - Fire Protection
  - Inservice Inspection/Inservice Testing
  - Criticality Safety
  - Facility Safety Program
  - Procedures and Guidelines

# Subpart G – Decommissioning

- Termination of power reactor licenses
  - Transition from operation to possession-only license
- Financial assurance for decommissioning
- Transition to unrestricted use

# Subpart H – Licensing

- General
- Siting
  - Site Suitability Reviews
  - Limited Work Authorizations
  - Early Site Permits
- Design
  - Conceptual Design Reviews?
  - Standard Design Approvals
  - Design Certifications
  - Manufacturing Licenses (MLs)
    - Manufacturing, Transportation, Deployment
- Site & Design
  - Construction Permit (CP)
  - Operating License
  - Combined Licenses (COL)
- Appendix A (Content Table)

# Subpart I – Maintaining Licensing Basis

- Amendments to a license
  - Application (review?)
  - Public notice and consultations
  - Issuance
- Updating Final Safety Analysis Report
  - Including probabilistic risk assessment (PRA)
- Revocation, suspension, modification of license for cause
- Retaking special nuclear material (SNM)
- Commission order for operation after revocation
- Suspension and operation in war or national emergency, (§ 50.54(d))
- Backfitting and Issue Finality
- Information requests (§ 50.54(f))

# Subpart J – Administrative and Reporting

- Common standards
- Selective implementation (relationship to Parts 50, 52)
- Reporting
- Notifications (§§ 50.72, 50.73)
- Financial Qualifications
- Creditor Regulations
- Enforcement
- US/International Atomic Energy Agency (IAEA)
- Bankruptcy (§ 50.54(cc))
- Property insurance (§ 50.54(w))
- Liability / Price Anderson
- Water pollution control act (§ 50.54(aa))
- National emergency, can deviate from technical specifications (TS) (§ 50.54(dd))
- Share SNM and byproduct material between units (§ 50.54(ee))
- Need to address Federal Emergency Management Agency deficiencies (§ 50.54(gg))
- Receipt of aircraft threat (§ 50.54(hh))
- American Society of Mechanical Engineers (§ 50.55(a)) & quality standards (§ 50.54(jj))
- SNM (§ 50.54(b)-(d))
- Antitrust (§ 50.54(g))
- Subject to laws & regulations – (§ 50.54(h))

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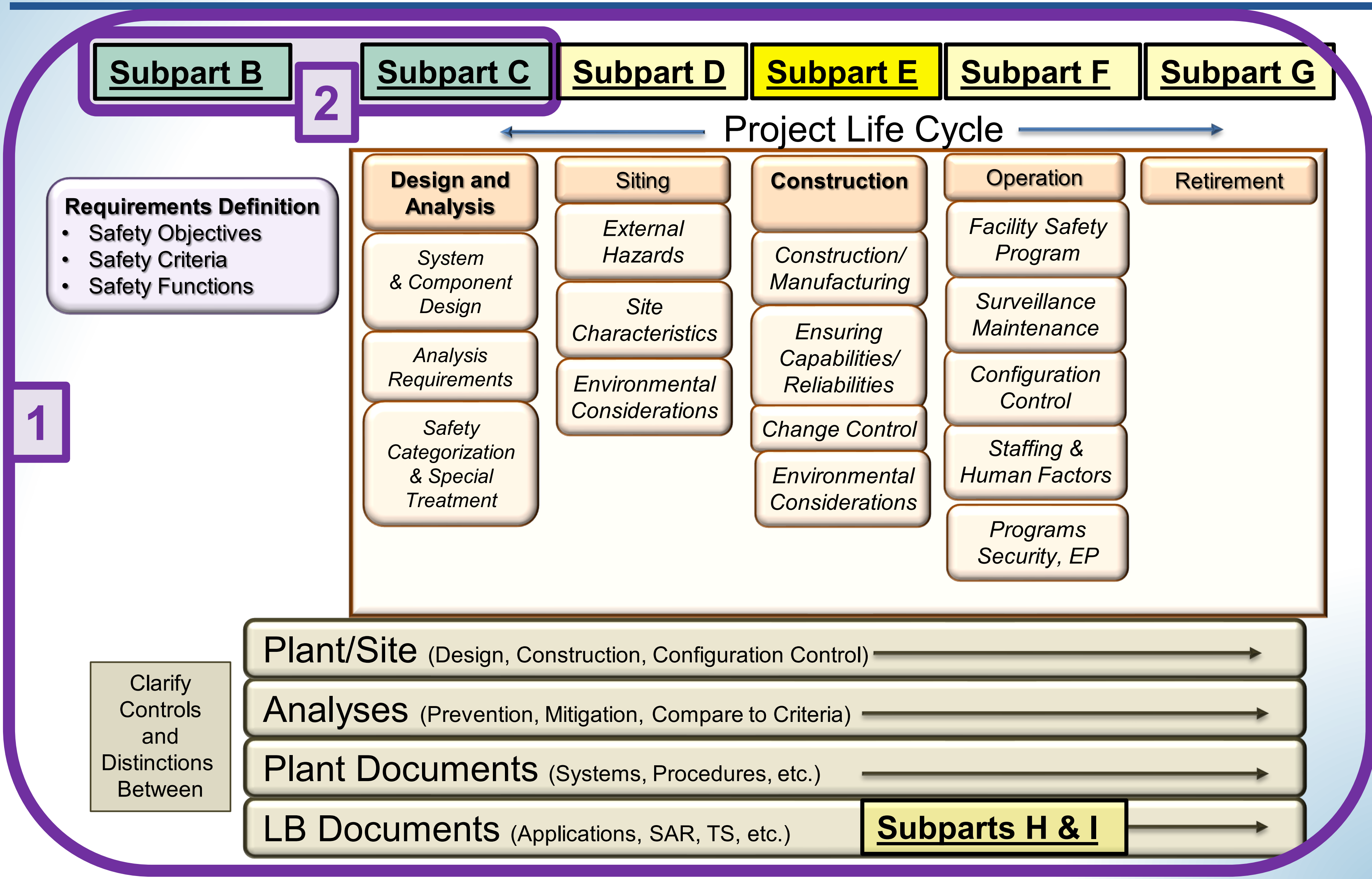
# NRC Staff Plan to Develop Part 53



# 2nd Iteration on Previously Released Preliminary Proposed Rule Language – Subpart B

# Feedback & Iterations

- This iterative rulemaking approach is novel and unprecedented at NRC.
- The Part 53 working group has received numerous internal and external comments on preliminary proposed rule text.
- We are continuing to assess those comments and may reflect assessment in future iterations of rule text.
- The NRC staff has developed internal management review processes for iterations of rule text.
- The preliminary proposed rule language will remain open for discussion as the staff works toward providing the Commission with the draft proposed rule package.
- The NRC staff may discuss some comments not reflected in rule text in the Commission paper transmitting draft proposed rule or in questions for comment in draft proposed rule Federal Register Notice.

# Part 50 and Part 53 Comparing Licensing Frameworks

- Safety criteria
  - Same safety criteria in Parts 50 and 53
  - Quantitative health objectives (QHOs) used in guidance under Part 50
- Design and Analyses
  - Design Basis Accidents (DBAs)
    - Part 50:  Assessed using prescriptive, highly conservative analyses
    - Part 53:  Assessed methodically considering event frequencies and assuming only safety-related structures, systems, and components (SSCs) are available
  - Beyond Design Basis Events (BDBEs)
    - Part 50:  Identified & assessed by largely ad-hoc, prescriptive approach with uncertainties addressed through conservatisms
    - Part 53:  Derived methodically using event frequencies with explicit consideration for uncertainties
- Special Treatment for Non-Safety-Related but Risk-Significant SSCs
  - Part 50:  Ad-hoc (e.g., § 50.69 programs, Reliability Assurance Programs)
  - Part 53:  Systematic approach to control frequencies and consequences of the LBEs in relation to safety criteria

# Additional Discussion – First Tier

- Possible Applications of First Tier Safety Criteria
  - Minimally acceptable level of safety
  - Met by satisfying the safety functions needed for dose < 25 rem
  - Provides basis for safety classification of SSCs
  - Demonstration of meeting the first tier safety criteria supported by analyses (DBA)
  - Provides basis for identifying SSCs needing protection against external events up to the design basis external hazard levels
  - Provides basis for identifying appropriate content of TS
    - Reserved for the most significant safety requirements
    - Necessary to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety
  - May provide basis for staffing and operator licensing decisions
  - Greatest level of detail for information in licensing documents

# Additional Discussion – Second Tier

- Possible Applications of Second Tier Safety Criteria
  - With first tier, ensures appropriate level of safety for long-term, risk-informed operations
  - Met by satisfying the safety functions for meeting QHOs
  - Demonstration of meeting the second tier safety criteria supported by systematic analyses
  - Provides basis for identifying additional risk-informed requirements
  - Provides basis for identifying appropriate special treatment for non-safety related SSCs
  - Provides basis for enabling risk management approach to operations
  - May provide basis for staffing and operator licensing decisions
  - Enables appropriate level of detail in licensing basis documentation based on a risk-informed, function-oriented and performance-based approach

# Feedback – Safety Objectives

**FIRST ITERATION**

**§ 53.200 Safety Objectives.**

Each advanced nuclear plant must be designed, constructed, operated, and decommissioned such that there is reasonable assurance of adequate protection of the public health and safety and the common defense and security. In addition, each advanced nuclear plant must take such additional measures to protect public health and minimize danger to life or property as may be reasonable when considering technology changes, economic costs, operating experience, or other factors identified in the assessments performed under the facility safety program required by § 53.800.

- Questions/comments on Safety Objectives
  - Need for and wording of objective to minimize danger
  - Alignment of objectives with first and second tier safety criteria
  - Incorporation of wording from Atomic Energy Act (AEA)

# Second Iteration - Objectives

**§ 53.200 Safety Objectives.**

Each advanced nuclear plant must be designed, constructed, operated, and decommissioned <u>to limit the possibility of an immediate threat to the public health and safety</u>. In addition, each advanced nuclear plant must <u>take such additional measures as may be appropriate when considering potential risks to public health and safety. These safety objectives shall be carried out by meeting the safety criteria identified in this subpart</u>.

- Discussion
  - Generally aligns with requirements for content of technical specifications and regulatory treatment of non-safety systems
  - Addresses concerns related to tying tiers to authorities provided in the AEA

# Feedback – First Tier

**FIRST ITERATION**
**§ 53.210 First Tier Safety Objectives.**
(a) Public dose does not exceed 0.1 rem from normal plant operation
(b) Provide design features and programmatic controls such that events with frequencies greater than once per 10,000 years meet the following
(1) 2-hour dose below 25 rem at exclusion area boundary (EAB)
(2) Duration dose below 25 rem at low population zone (LPZ) boundary
(c) Additional requirements established by NRC to ensure reasonable assurance of adequate protection

- Questions/comments on First Tier Safety Criteria
  - Inclusion of normal operations
  - Open-endedness of Paragraph (c)
  - Concerns that connection to adequate protection standard was leading to perception that additional requirements not needed

# Second Iteration – First Tier

**§ 53.210 First Tier Safety Criteria.**

(a) Public dose does not exceed Part 20 limit (0.1 rem) from normal plant operation

(b) Provide design features and programmatic controls such that events with frequencies greater than once per 10,000 years meet the following

(1) 2-hour dose below 25 rem at EAB

(2) Duration dose below 25 rem at LPZ boundary

~~(c) Additional requirements established by NRC to ensure reasonable assurance of adequate protection~~

- Discussion
  - Maintains technical criteria from first iteration
  - Generally aligns with requirements for content of technical specifications and regulatory treatment of non-safety systems
  - Deleted paragraph (c) since the first tier criteria are no longer tied to adequate protection standard
  - Added existing footnote on 25 rem as reference value
  - General note that staff assessing terminology (tiers)

# Feedback – Second Tier

**FIRST ITERATION**

**§ 53.220 Second Tier Safety Criteria**

a) Normal Operations – Public dose as low as reasonably achievable (ALARA) with performance goals from Appendix I to 10 CFR Part 50

(b) Design features and programmatic controls provided to:

(1) Address LBEs and defense in depth

(2) Maintain overall cumulative plant risks below QHOs

- Questions/comments on Second Tier Safety Criteria
  - Overall need for the second tier
  - Inclusion of normal operations ALARA requirement
  - Use of QHOs as codified safety criteria

# Feedback – 2nd Tier, ALARA

- ALARA
  - Proposal by some stakeholders to eliminate all ALARA requirements under Part 53.
- NRC Iteration: Maintained requirements for normal operations and occupational exposures to be ALARA

Note that concerns related to ALARA and NRC reviews of design-related applications are also being addressed through the Advanced Reactor Content of Application Project with current drafts of Chapter 9 released to support stakeholder interactions:

*"... in lieu of providing detailed system descriptions and analysis of estimated effluent releases as required by 10 CFR 50.34, 50.34a, 52.47, and 52.79, an application may demonstrate compliance with the applicable regulations by describing a radiation protection program and an effluent release monitoring program that will ensure that effluent release limits will be met during normal operations for the life of the plant. Information related to physical systems can be limited to general descriptions of layout and technologies used to limit the release of the various inventories of radioactive materials within the plant."*

# Feedback – 2nd Tier, QHOs

- QHOs
  - Proposal by some stakeholders to maintain QHOs as policy but exclude from rule
    - Some concern over use of QHOs related to inclusion of requirement to perform PRA
  - Proposal by some stakeholders to use a metric other than QHOs as second tier
    - Range of stakeholder views, from use of QHOs to use of cost-benefit assessment for second tier, which in NRC practice includes assessment against QHOs
- NRC Iteration: Maintained QHOs within the second tier safety criteria
  - The QHOs are a well-established measure used in NRC risk-informed decision making and are a logical performance metric to support the risk management approaches to operations that will be reflected in Subpart F, “Operations.”
  - Note that using less defined criteria for the second tier would decrease the predictability of the regulations in terms of the desired graded approach (e.g., differentiation between SSCs that are safety related and non-safety related with special treatment)

# Second Iteration – Second Tier

- Second Tier Safety Criteria

**FIRST ITERATION/SECOND ITERATION**
**§ 53.220 Second Tier Safety Criteria.**

(a) *Normal operations*. Design features and programmatic controls must be provided for each advanced nuclear plant to ensure the estimated total effective dose equivalent to individual members of the public from effluents resulting from normal plant operation are as low as is reasonably achievable taking into account the state of technology, the economics of improvements in relation to the state of technology, operating experience, and the benefits to the public health and safety. Design features and programmatic controls must be established such that [to be reworded for consistency with 10 CFR part 20 and 40 CFR part 190].

(b) *Unplanned events*. Design features and programmatic controls must be provided to:

(1) Ensure plant SSCs, personnel, and programs provide the necessary capabilities and maintain the necessary reliability to address licensing basis events in accordance with § 53.240 and provide measures for defense-in-depth in accordance with § 53.250; and

(2) Maintain overall cumulative plant risk from licensing basis events such that the risk to an average individual within the vicinity of the plant receiving a radiation dose with the potential for immediate health effects remains below five in 10 million years, and the risk to such an individual receiving a radiation dose with the potential to cause latent health effects remains below two in one million years.

# Proposed Second Iteration

- Discussion (Second Tier Safety Criteria)
  - Maintains second tier to ensure appropriate level of safety for long-term, risk-informed operations
  - Maintains ALARA for normal operations as longstanding element of NRC regulations
  - Maintains QHOs for unplanned events as well established policy and measure for risk-informed decisionmaking

# Feedback – Safety Functions

**FIRST ITERATION**

**§ 53.230 Safety Functions**

(a) The primary safety function is limiting the release of radioactive materials from the facility and must be maintained during routine operation and for licensing basis events over the life of the plant.

(b) Additional safety functions supporting the retention of radioactive materials during routine operation and licensing basis events—such as controlling heat generation, heat removal, and chemical interactions--must be defined.

(c) Design features and programmatic controls serve to fulfill the primary safety function and additional safety functions and must be maintained over the life of the plant.

- Questions/comments on Safety Functions
  - Proposal by some stakeholders to explicitly cite fundamental safety functions.

# Second Iteration – Safety Functions

## § 53.230 Safety Functions

(a) The primary safety function is limiting the release of radioactive materials from the facility and must be maintained during routine operation and for licensing basis events over the life of the plant.

(b) Additional safety functions supporting the retention of radioactive materials during routine operation and licensing basis events—such as controlling heat generation, heat removal, and chemical interactions--must be defined.

**(c)**~~Design features and programmatic controls serve to fulfill the primary safety function and additional safety functions and must be maintained over the life of the plant.~~ **The primary and additional safety functions are required to meet the first and second tier safety criteria and are fulfilled by the design features and programmatic controls specified throughout this part.**

- Discussion (Safety Functions)
  - Maintains mention of fundamental safety functions as examples to maintain technology-inclusive framework (with potential use for multiple inventories of radionuclides within plants and possibly technologies such as fusion energy systems)
  - Reinforces general hierarchy of safety criteria, safety function, design feature, and functional design criteria.

# Feedback – Licensing Basis Events

**FIRST ITERATION**

**§ 53.240 Licensing Basis Events**

Licensing basis events must be identified for each advanced nuclear plant and analyzed in accordance with § 53.[3x] to support assessments of the safety requirements of this subpart B. The licensing basis events must address combinations of malfunctions of plant SSCs, human errors, and the effects of external hazards ranging from anticipated operational occurrences to highly unlikely event sequences that are not expected to occur in the life of the advanced nuclear plant. The evaluation of licensing basis events must be used to confirm the adequacy of design features and programmatic controls needed to satisfy first and second tier safety criteria of this subpart and to establish related functional requirements for plant SSCs, personnel, and programs.

- Questions/comments on LBEs:
  - Comments generally associated with other areas such as the first and second tier safety criteria
  - Some discussion on use of alternative paths such as the use of a maximum hypothetical accident concept

# Second Iteration – Licensing Basis Events

**§ 53.240 Licensing Basis Events**

Licensing basis events must be identified for each advanced nuclear plant and analyzed in accordance with § 53.450 to support assessments of the safety requirements
in this subpart B. The licensing basis events must address combinations of malfunctions of plant SSCs, human errors, and the effects of external hazards **ranging from anticipated operational occurrences to ~~highly~~ very unlikely event sequences**
**~~that are not~~ with estimated frequencies well below the frequency of events expected to occur in the life of the advanced nuclear plant.** The evaluation of licensing basis events must be used to confirm the adequacy of design features and programmatic controls needed to satisfy first and second tier safety criteria of this subpart and to establish related functional requirements for plant SSCs, personnel, and programs.

- Discussion (LBEs)
  - Changes to clarify the range of scenarios to be addressed by LBEs

# Feedback – Defense in Depth

**FIRST ITERATION**
**§ 53.250 Defense in Depth**
Measures must be taken for each advanced nuclear plant to ensure appropriate defense in depth is provided to compensate for epistemic and aleatory uncertainties such that there is high confidence that the safety criteria in this subpart B are met over the life of the plant. The epistemic and aleatory uncertainties to be considered include those related to the ability of barriers to limit the release of radioactive materials from the facility during routine operation and for licensing basis events and those related to the reliability and performance of plant SSCs and personnel, and programmatic controls. Measures to compensate for these uncertainties can include increased safety margins in the design of SSCs and providing alternate means to accomplish safety functions. **No single design or operational feature, no matter how robust, should be exclusively relied upon to meet the safety criteria of 10 CFR part 53.**

- Questions/comments on Defense in Depth:
  - Treat as a design philosophy similar to Parts 50 and 52
  - Unnecessary as a requirement and would create unintended consequences
  - Prescriptive “no single feature” requirement is unnecessary and not risk informed
  - Clarify what is required when prevention or mitigation is related to inherent characteristics

# Second Iteration – Defense in Depth

**§ 53.250 Defense in Depth**

Measures must be taken for each advanced nuclear plant to ensure appropriate defense in depth is provided to compensate for uncertainties such that there is high confidence that the safety criteria in this subpart are met over the life of the plant. The uncertainties to be considered include those related to the state of knowledge and modeling capabilities, the ability of barriers to limit the release of radioactive materials from the facility during routine operation and for licensing basis events, and those related to the reliability and performance of plant SSCs, personnel, and programmatic controls. No single ~~**engineered**~~ design feature, human action, or programmatic control, no matter how robust, should be exclusively relied upon to meet the safety criteria of § 53.220(b) or the safety functions defined in accordance with § 53.230.

- Discussion (Defense in Depth)
  - Maintains defense in depth within Subpart B because of historical and continued importance of its role in addressing risk
  - Parts 50/52 do not include a similar section because the defense-in-depth philosophy is incorporated into prescriptive technical requirements for light-water reactors
  - Possibility that this section could be addressed within Subpart C can be considered as part of the later review of the technical requirements
  - Reflects possible crediting of inherent characteristics within the design and analysis for advanced reactors and the reduced uncertainties associated with such characteristics

# Feedback – Protection of Plant Workers

**FIRST ITERATION**

**§ 53.260 Protection of Plant Workers**

(a) Design features and programmatic controls must exist for each advanced nuclear plant to ensure that radiological dose to plant workers does not exceed the occupational dose limits provided in subpart C to 10 CFR part 20.

(b) The licensee must use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable.

- Questions/comments on Protection of Plant workers:
  - Exclude occupational dose from Part 53 or confine to reference to Part 20.
  - Some stakeholders favored retaining these requirements in light of relative importance of potential occupational exposures for some advanced reactor technologies

# Second Iteration – Protection of Plant Workers

**§ 53.260 Protection of Plant Workers**

(a) Design features and programmatic controls must exist for each advanced nuclear plant to ensure that radiological dose to plant workers does not exceed the occupational dose limits provided in subpart C to 10 CFR part 20.

(b) ~~The licensee~~ **As required by Subpart B to 10 CFR part 20, design features and programmatic controls** must ~~use~~, to the extent practical, ~~procedures and engineering controls~~ be based upon sound radiation protection principles to achieve occupational doses ~~and doses to members of the public~~ that are as low as is reasonably achievable.

- Discussion (Protection of Plant Workers)
  - Maintains the protection of plant workers within Subpart B to capture occupational exposures within the high-level safety requirements
  - Changed to refer to part 20, as suggested by stakeholders

Note that ALARA is not only a long-standing requirement by Atomic Energy Commission/NRC (including maintaining in Part 20 rulemaking) but also is addressed in U.S. Environmental Protection Agency Federal Guidance for Radiation Protection

# Discussion

# 2nd Iteration on Previously Released Preliminary Proposed Rule Language – Subpart C

# Feedback – Design

**§ 53.400 Design ~~Objectives and Design~~ Features**
**§ 53.410 Functional Design Criteria for First Tier Safety Criteria**
**§ 53.420 Functional Design Criteria for Second Tier Safety Criteria**
**§ 53.430 Functional Design Criteria for Protection of Plant Workers**
**§ 53.440 Design Requirements**

- Questions/comments on Design Requirements
  - Comments generally associated with other areas such as the first and second tier safety criteria, occupational exposures, etc.

# Second Iteration – Design

**§ 53.400 Design ~~Objectives and Design~~ Features**
**§ 53.410 Functional Design Criteria for First Tier Safety Criteria**
**§ 53.420 Functional Design Criteria for Second Tier Safety Criteria**
**§ 53.430 Functional Design Criteria for Protection of Plant Workers**
**§ 53.440 Design Requirements**

- Discussion (Design)
  - Maintains these sections and their role in helping to establish the general hierarchy of safety criteria, safety function, design feature, and functional design criteria.

# Feedback – Analysis (PRA)

**First Iteration**
**§ 53.450 Analysis Requirements**
**(a) A probabilistic risk assessment (PRA) of each advanced nuclear plant [reminder – plant definition to include multi-module and multi-source] must be performed to identify potential failures, degradation mechanisms, susceptibility to internal and external hazards, and other contributing factors to unplanned events that might challenge the safety functions identified in § 53.230.**

- Questions/comments on Analysis Requirements
  - Don't require PRA or require a "risk-informed assessment" instead
  - Support more deterministic approaches to design and analysis

# Second Iteration – Analysis (PRA)

**§ 53.450 Analysis Requirements**

(a) *Requirement to have a probabilistic risk assessment*. A probabilistic risk assessment (PRA) of each advanced nuclear plant [reminder – plant definition to include multi-module and multi-source] must be performed to identify potential failures, degradation mechanisms, susceptibility to internal and external hazards, and other contributing factors to unplanned events that might challenge the safety functions identified in § 53.230 **and to support demonstrating that each advanced nuclear plant meets the second tier safety criteria of § 53.220(b).**

- Discussion (PRA)
  - Maintains requirement in Part 53 for PRA consistent with evolution of risk-informed approaches but provide alternatives to PRA for design and analysis processes (paragraph (b)) and to support the licensing and regulatory programs being developed in subsequent subparts
  - Staff is engaged in ongoing discussions on how to ensure the level of effort required for a PRA is commensurate with the complexity of the subject reactor design while also ensuring possible deployment of advanced reactors poses no undue risk to public health and safety.

# Feedback – Analysis (Use of PRA)

**First Iteration**
**§ 53.450 Analysis Requirements**
**(b) Requirement to use PRA to:**

- **Determine licensing basis events**
- **Support safety classification of SSCs**
- **Evaluate defense in depth**

- Questions/comments on Use of PRA
  - Support more deterministic approaches to design and analysis
  - Support international regulatory frameworks (e.g., IAEA SSR-2/1)
  - Extensive PRA with application submittal may not be feasible for all application types, especially for plants in early phases of application
  - Concerns about connection to PRA standards and capability categories

# Second Iteration – Analysis (Use of PRA)

**§ 53.450 Analysis Requirements**
**(b) Requirement to use PRA, <u>other generally accepted risk-informed approach for systematically evaluating engineered systems, or combination thereof</u> to:**
- **Determine LBEs**
- **Support safety classification of SSCs**
- **Evaluate defense in depth**

- Discussion (Use of PRA)
  - Change intended to support alternative approaches to a PRA
  - Worded in terms of "generally accepted" to support possible standards or other guidance documents
  - The use of guidance, Part 53 rule language, or revisions to Part 50 are being explored as possible ways to accommodate deterministic approaches for performing design and analysis

# Feedback – Analysis (Other)

**§ 53.450 Analysis Requirements**

- **Maintenance and upgrade of analyses**
- **Qualification of analytical codes**
- **Analysis of DBAs**
- **Other required analyses**

- Questions/comments on Analysis Requirements
  - How should requirements for analysis of fires, aircraft impact, and specific BDBEs be addressed?

# Second Iteration – Analysis Requirements (c – g)

**§ 53.450 Analysis Requirements**
**(c) Maintenance and upgrade of analyses**
**(d) Qualification of analytical codes**
**(e) Analyses of LBEs (added)**
**(f) Analysis of DBAs**
**(g) Other required analyses**

- Discussion (Analysis Requirements)
  - Clarification of maintenance and upgrading of analyses (referring to codes and standards)
  - Maintain placeholder for other required analyses to address fire protection, aircraft impact, and specific beyond design basis accidents.

# Second Iteration – Analysis Requirements (c – g)

**§ 53.450(e) Analyses of licensing basis events [New sub-paragraph]**

(e) *Analyses of licensing basis events*. Analyses must be performed for licensing basis events ranging from anticipated operational occurrences to very unlikely event sequences with estimated frequencies well below the frequency of events expected to occur in the life of the advanced nuclear plant. The licensing basis events must be identified using insights from a PRA, other generally accepted risk-informed approach for systematically evaluating engineered systems, or combination thereof to systematically identify and analyze equipment failures and human errors. The analyses must address event sequences from initiation to a defined end state and demonstrate that the functional design criteria required by § 53.420 provide sufficient barriers to the unplanned release of radionuclides to satisfy the second tier safety criteria of § 53.220(b) and provide defense in depth as required by § 53.250.

- Discussion (Analyses of LBEs)
  - Section added to clarify requirements for LBEs, including analysis from initiation to a defined end state
  - Staff considering further clarification for anticipated operational occurrences in terms of acceptance criteria beyond QHOs and defense in depth

# Second Iteration – Analysis Requirements (c – g)

**§ 53.450 (f) Analysis of design basis accidents**

(f) *Analysis of design basis accidents.* The analysis of licensing basis events required by § 53.240 and § 53.450(e) must include analysis of a set of design basis accidents that address possible challenges to the safety functions identified in accordance with § 53.230. Design basis accidents must be selected from those unanticipated event sequences with an upper bound frequency of less than one in 10,000 years as identified using insights from a PRA, other generally accepted risk-informed approach for systematically evaluating engineered systems, or combination thereof to systematically identify and analyze equipment failures and human errors. The events selected as design basis accidents should be those that, if not terminated, have the potential for exceeding the safety criteria in § 53.210(b**).** **The design-basis accidents selected must be analyzed using deterministic methods that address event sequences from initiation to a safe stable end state and assume only the safety-related SSCs identified in § 53.460 and human actions addressed by § 53.8xx (reference to concept of operations sections of Subpart F) are available to perform the safety functions identified in accordance with § 53.230.** The analysis must conservatively demonstrate compliance with the safety criteria in § 53.210(b).

- Discussion (DBAs)
  - Revised to clarify that analysis is to address sequences from initiation to a safe stable end state.

# Feedback – Safety Classification

**First Iteration**

**§ 53.460 Safety Categorization and Special Treatment**

(a) SSCs and human actions must be classified according to their safety significance. The categories must include “Safety Related” (SR), which are those SSCs and human actions relied upon to function in response to design basis accidents to meet the safety criteria in § 53.220(b); “Non-Safety Related but Safety Significant” (NSRSS), which are those SSCs and human actions that perform a function that is necessary to achieve adequate defense-in-depth or are classified as risk significant (i.e., whose failure contributes 1% or more to cumulative plant risk, as defined in § 53.230, or would cause a licensing basis event to exceed the safety criteria in § 53.220(b)); and “Non-Safety Significant” (NSS), which are those SSCs not warranting special treatment.

- Questions/comments on Safety Classification
- Some proposing more generic/undefined safety classification (possibly supporting international practices)

# Second Iteration – Safety Classification

**§ 53.460 Safety Categorization and Special Treatment**

(a) SSCs and human actions must be classified

according to their safety significance. The categories must include "Safety Related" (SR), ~~which are those SSCs and human actions relied upon to function in response to design basis accidents to meet the safety criteria in § 53.220(b); "Non-Safety Related but Safety Significant" (NSRSS), which are those SSCs and human actions that perform a function that is necessary to achieve adequate defense-in-depth or are classified as risk significant (i.e., whose failure contributes 1% or more to cumulative plant risk, as defined in § 53.230, or would cause a licensing basis event to exceed the safety criteria in § 53.220(b)); and "Non-Safety Significant" (NSS), which are those SSCs not warranting special treatment~~**"Non-Safety Related but Safety Significant" (NSRSS), and "Non-Safety Significant" (NSS), as defined in subpart A of this part**.

- Discussion
  - Editorial changes to remove material duplicating preliminary rule language in other sections
  - Maintaining for now the specific categories of safety related, non-safety related but safety significant, and non-safety significant

# Feedback – Analytical Margins and Operating Flexibilities

**First Iteration**

**§ 53.470 Application of Safety Margins to Operational Flexibilities**

Where an applicant or licensee so chooses, design criteria more restrictive than those defined in § 53.220(b) may be adopted to support operational flexibilities (e.g., emergency planning requirements under Subpart F of this part). In such cases, applicants and licensees must ensure that the functional design criteria of § 53.420(b), the analysis requirements of § 53.450, and identification of special treatment of SSCs and human actions under § 53.460 reflect and support the use of alternative design criteria to obtain additional analytical safety margins. Licensees must ensure that measures taken to provide the analytical margins supporting operational flexibilities are incorporated into design features and programmatic controls and are maintained within programs required in other Subparts.

- Questions/comments on application of safety margins
  - General questions on how process would work and integrate with operational requirements
  - Many stakeholders reserving comments pending release of requirements for operation (Subpart F)

# Second Iteration – Analytical Margins and Operating Flexibilities

**§ 53.470 Application of Safety Margins to Operational Flexibilities (No Change)** Where an applicant or licensee so chooses, design criteria more restrictive than those defined in § 53.220(b) may be adopted to support operational flexibilities (e.g., emergency planning requirements under Subpart F of this part). In such cases, applicants and licensees must ensure that the functional design criteria of § 53.420(b), the analysis requirements of § 53.450, and identification of special treatment of SSCs and human actions under § 53.460 reflect and support the use of alternative design criteria to obtain additional analytical safety margins. Licensees must ensure that measures taken to provide the analytical margins supporting operational flexibilities are incorporated into design features and programmatic controls and are maintained within programs required in other Subparts.

- Discussion
  - No change. Release of related requirements in Subpart F expected to support public meeting on May 6th

# Feedback – Design Control QA and Design Interfaces

**First Iteration**
**§ 53.480 Design Control Quality Assurance**
**§ 53.490 Design Interfaces**

- Questions/comments on QA and design interfaces
  - Many stakeholders reserving comments pending release of other subparts

- Discussion
  - No change. Release of related requirements in Subpart F expected to support public meeting on May 6th

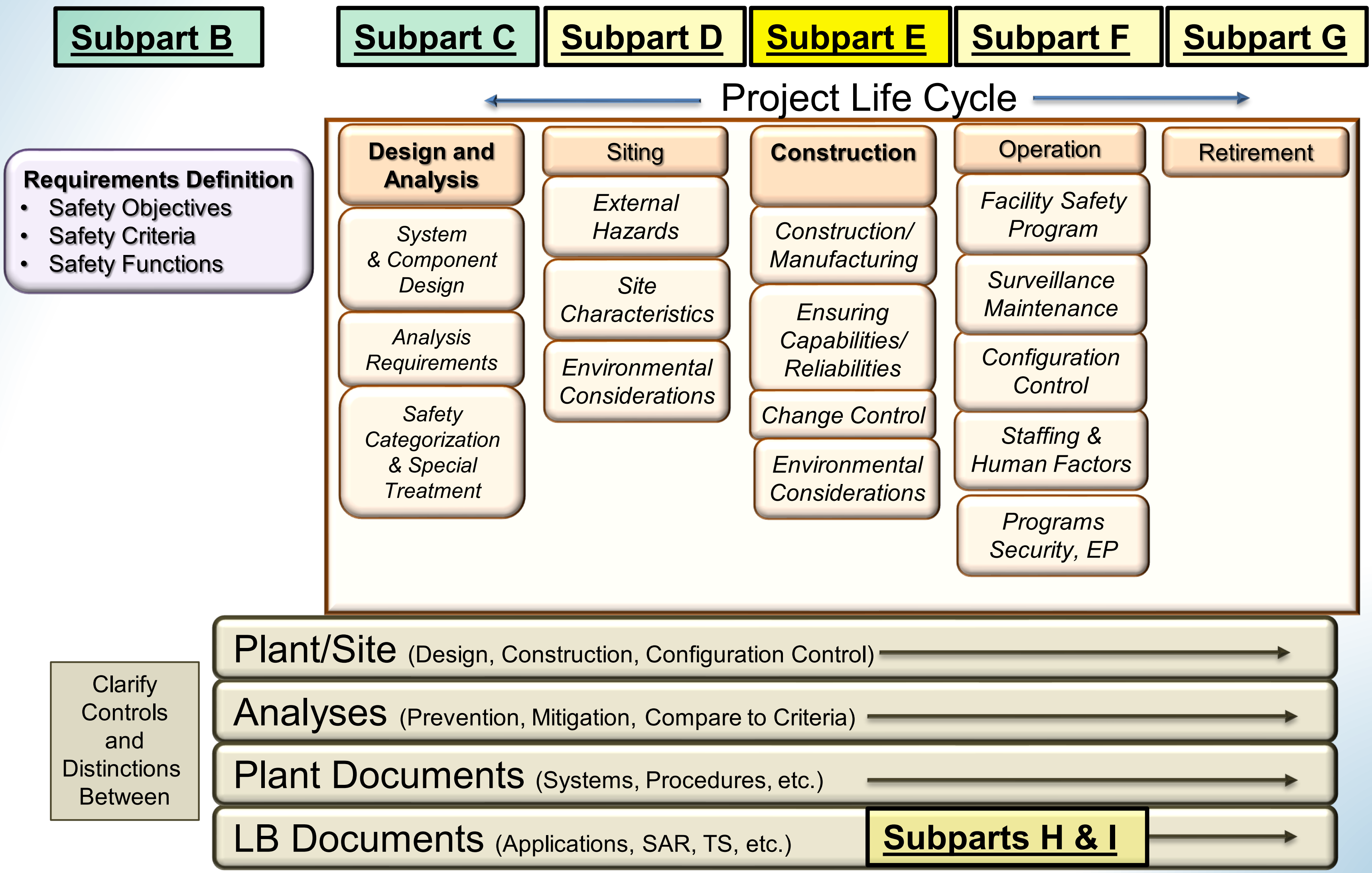
# Feedback – Non-Radiological Hazards

- Non-Radiological Hazards
  - Some ACRS members noted inclusion of non-radiological hazards should be considered in Part 53, such as chemical releases.
    - Staff has this issue under consideration and recognizes existing frameworks for addressing this multi-jurisdictional topic
    - Does ACRS have feedback on this topic that could inform the Staff’s ongoing considerations?

# Discussion

# Subpart E – Construction and Manufacturing

# NRC Staff Plan to Develop Part 53



# Part 53 General Layout

- Subpart A, General Provisions
- Subpart B, Technology-Inclusive Safety Objectives
- Subpart C, Design and Analysis
- Subpart D, Siting Requirements
- Subpart E, Construction and Manufacturing
- Subpart F, Requirements for Operation
  - Facility Safety Program
- Subpart G, Decommissioning Requirements
- Subpart H, Applications for Licenses, Certifications and Approvals
- Subpart I, Maintaining and Revising Licensing Basis Information
- Subpart J, Reporting and Administrative Requirements

# Subpart E – Construction and Manufacturing

- Scope and Purpose
- Part 1 – Construction
  - (a) Management and Control
  - (b) Construction Activities
  - (c) Inspection and Acceptance
  - (d) Communication
- Part 2 – Manufacturing
  - (a) Management and Control
  - (b) Manufacturing Activities
  - (c) Fuel Loading
  - (d) Communication
  - (e) Transportation
  - (f) Acceptance and Installation at the Site

# § 53.600 – Scope and Purpose

- Subpart applicable to construction and manufacturing activities authorized by CP, COL, ML, or a Limited Work Authorization

# § 53.610 – Construction

- Management and Control
  - Design and analyses conform with subpart C
  - Organization and procedures describing qualifications, responsibilities, and interfaces
  - Program to evaluate construction experience
  - Preliminary emergency plan for site, fitness-for-duty program
  - QA conforms to generally accepted codes and standards
  - Radiation protection, information security, and cyber security programs, as applicable

# § 53.610 – Construction

- Construction Activities
  - Procedures in place to appropriately handle special nuclear material, multi-unit site hazards, control of design, redress plan
  - Requirements for fresh fuel storage, fire protection
- Inspection and Acceptance
  - Inspect and test SSCs prior to acceptance
- Communication
  - Procedures for coordinating with other units and NRC

# § 53.620 – Manufacturing

- Management and Control
  - Design and analyses conform with subpart C
  - Organization and, procedures describing qualifications, responsibilities, and interfaces
  - Program to evaluate manufacturing experience
  - Fitness-for-duty program
  - QA conforms to generally accepted codes and standards
  - Radiation protection, information security, and cyber security programs, as applicable

# § 53.620 – Manufacturing

- Manufacturing Activities
  - Adhere to manufacturing license, conform to generally accepted codes and standards
  - Procedures in place to appropriately handle SNM, fresh fuel, fire protection, emergency planning (EP), radiation protection, minimizing contamination
- Fuel Loading – Develop further, if pursued

# § 53.620 – Manufacturing

- Communication – Stay in contact with NRC
- Transportation
  - Interface with 10 CFR Part 71
  - Procedures for movement, transfer only to accepted license holders
  - Supports fixed siting of manufactured reactors
  - Not currently planning to address mobile reactors
- Acceptance and Installation
  - Reactor must be certified in compliance with ML prior to installation
- Consideration of transport and disposal post operation in subsequent subparts

# § 53.620 – Manufacturing Factory Fuel Loading

- Revising ML provisions (currently in Subpart F of 10 CFR Part 52) seems logical way to address microreactor strategies (factory assembly)
- ML can be referenced in applications for construction permit or combined license
  - Key role of ML will continue to be supporting the safety case for construction and operation of specific reactors
- Loading fuel at factory is a potential deployment strategy for some microreactors
- Staff evaluating the safety implications within the factory setting and possible roles of ML and requirements within 10 CFR Part 70

# § 53.620 – Manufacturing Transportation

- Staff evaluating the safety and licensing implications of transporting fueled reactors
- Review of safety and security requirements and possible changes to 10 CFR Part 71
- Questions related to transport of fueled reactors from factory to operating site with fresh or recycled fuel
- Questions related to transport of fueled reactor from operating site to factory, recycle facility, or waste facility

# Subpart E: Construction and Manufacturing

# Discussion

# Final Discussion and Questions

# Part 53 Rulemaking Schedule

| Milestone Schedule | |
|---|---|
| **Major Rulemaking Activities/Milestones** | Schedule |
| **Public Outreach, ACRS Interactions and Generation of Proposed Rule Package** | Present to April 2022 (12 months) |
| **Submit Draft Proposed Rule Package to Commission** | May 2022 |
| **Publish Proposed Rule and Draft Key Guidance** | October 2022 |
| **Public Comment Period – 60 days** | November and December 2022 |
| **Public Outreach and Generation of Final Rule Package** | January 2023 to February 2024 (14 months) |
| **Submit Draft Final Rule Package to Commission** | March 2024 |
| **Office of Management and Budget and Office of the Federal Register Processing** | July 2024 to September 2024 |
| **Publish Final Rule and Key Guidance** | October 2024 |

# Acronyms and Abbreviations

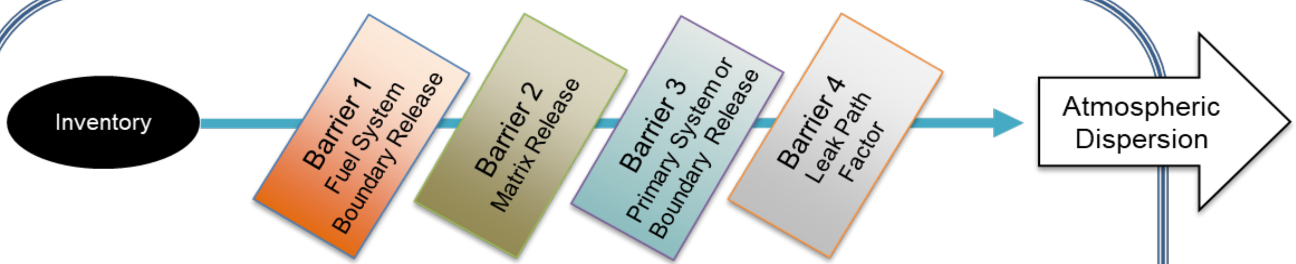
| | |
|---|---|
| ACRS | Advisory Committee on Reactor Safeguards |
| ADAMS | Agencywide Document Access Management System |
| AEA | Atomic Energy Act |
| ALARA | As low as reasonably achievable |
| BDBEs | Beyond design basis events |
| CFR | Code of Federal Regulations |
| CP | Construction permit |
| COL | Combined operating license |
| DBAs | Design basis accidents |
| EAB | Exclusion area boundary |
| EP | Emergency planning |
| IAEA | International Atomic Energy Agency |

| | |
|---|---|
| LBE | Licensing basis event |
| LPZ | Low population zone |
| ML | Manufacturing license |
| NRC | U.S. Nuclear Regulatory Commission |
| NSRSS | Non-safety related but safety significant |
| NSS | Non-safety significant |
| PRA | Probabilistic risk assessment |
| QA | Quality assurance |
| QHO | Quantitative health objective |
| SAR | Safety analysis report |
| SNM | Special nuclear material |
| SSCs | Structures, systems, and components |
| SR | Safety related |
| TS | Technical specifications |

# Background Slides

# First Principles

*Recent NRC activities related to advanced reactors (e.g., functional containment performance criteria, possible changes to emergency planning & security, and DG-1353) recognize the limitations of existing LWR-related guidance, which requires a return to first principles such as fundamental safety functions supporting the retention of radionuclides*

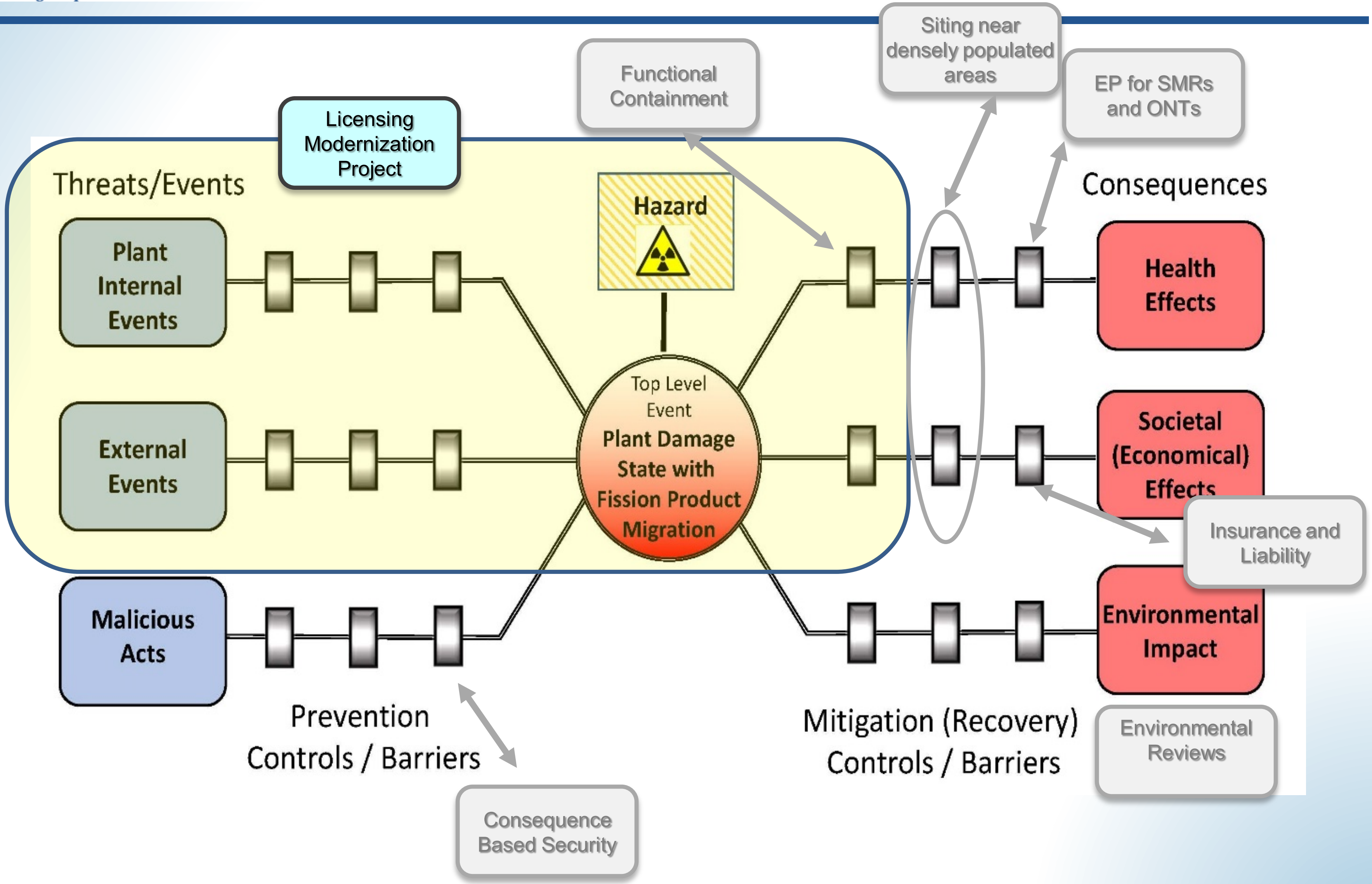



$$\underbrace{I(RN_j)}_{\text{Initial inventory}} \cdot \underbrace{F(S_i,t) \cdot MR(S_i,RN_j,t) \cdot PSR(S_i,RN_j,t) \cdot LPF(S_i,RN_j,t)}_{\text{Factors that determine how much of the inventory is released across a given barrier and thus persists to the source term}} = ST(S_i,RN_j,t)$$

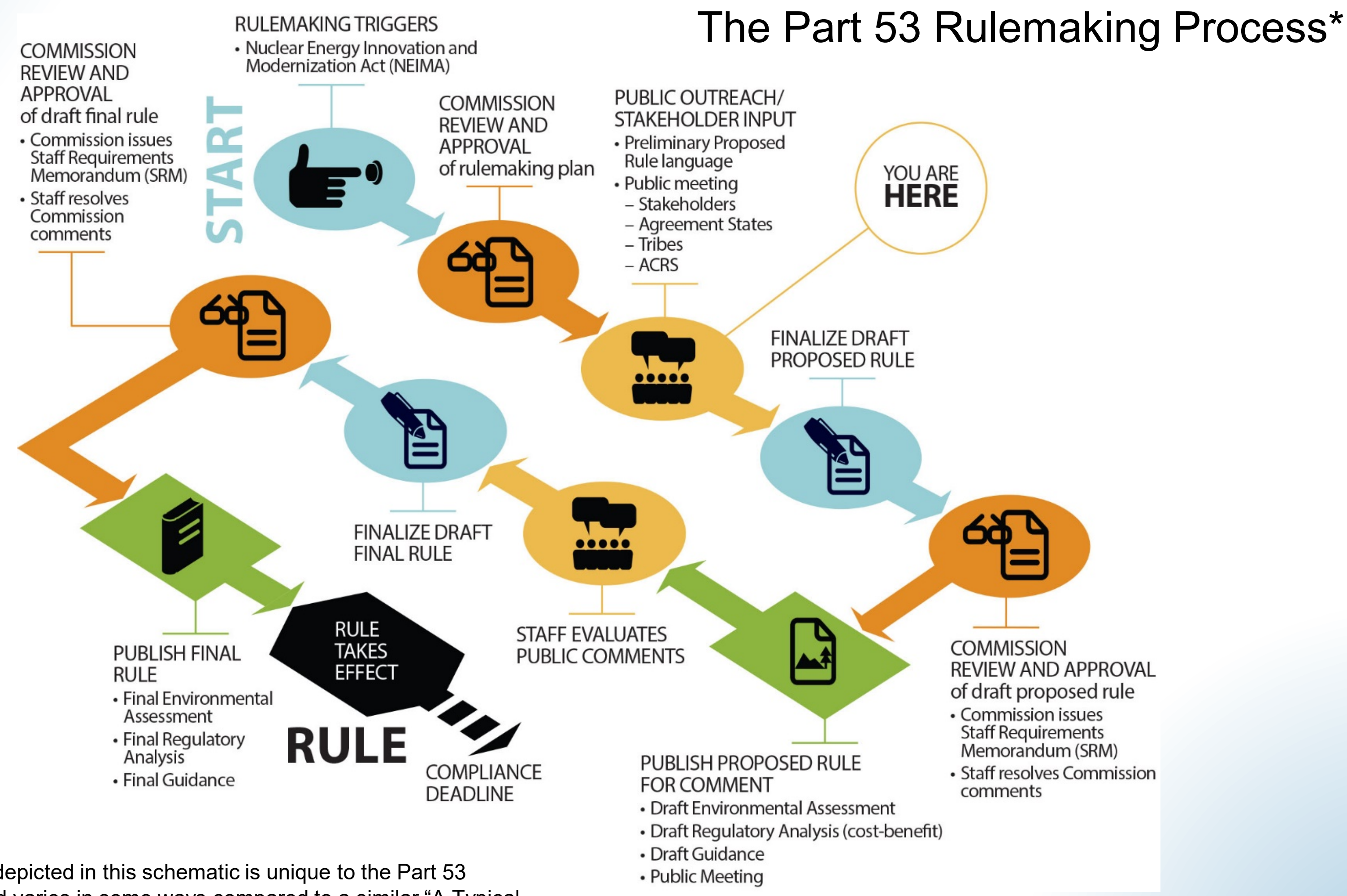
Each factor is, in turn, a function of its initial design characteristics (e.g., materials), operating conditions (e.g., burnup, aging) and *transient/accident conditions (e.g., time, temperatures, pressures, chemistry)*.

See: SECY-18-0096, "Functional Containment Performance Criteria for Non-Light-Water-Reactors," and INL/EXT-20-58717, "Technology-Inclusive Determination of Mechanistic Source Terms for Offsite Dose-Related Assessments for Advanced Nuclear Reactor Facilities"

# Integrated Approach



# Part 53 Rulemaking




*The process depicted in this schematic is unique to the Part 53 rulemaking and varies in some ways compared to a similar “A Typical Rulemaking Process” schematic available on the NRC’s public website.

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# Background

- Nuclear Energy Innovation and Modernization Act (NEIMA; Public Law 115-439) signed into law in January 2019 requires the NRC to complete a rulemaking to establish a technology-inclusive, regulatory framework for optional use for commercial advanced nuclear reactors no later than December 2027
    - (1) ADVANCED NUCLEAR REACTOR—The term "advanced nuclear reactor" means a nuclear fission or fusion reactor, including a prototype plant… with significant improvements compared to commercial nuclear reactors under construction as of the date of enactment of this Act, …