Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
Future Plant Designs and Regulatory Policies
and Practices Subcommittees

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Wednesday, August 22, 2018

Work Order No.: NRC-3859 Pages 1-185

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

DISCLAIMER

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

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards, as reported herein, is a record of the discussions recorded at the meeting.

This transcript has not been reviewed, corrected, and edited, and it may contain inaccuracies.

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

FUTURE PLANT DESIGNS AND REGULATORY POLICIES AND PRACTICES SUBCOMMITTEES

+ + + + +

WEDNESDAY

AUGUST 22, 2018

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:30 a.m., Dennis C. Bley, Chairman, presiding.

COMMITTEE MEMBERS:

DENNIS C. BLEY, Chairman

RONALD G. BALLINGER, Member

CHARLES H. BROWN, JR., Member

MICHAEL L. CORRADINI, Member

WALTER L. KIRCHNER, Member

JOSE A. MARCH-LEUBA, Member

JOY L. REMPE, Member

PETER C. RICCARDELLA, Member*

GORDON R. SKILLMAN, Member

MATTHEW W. SUNSERI, Member

DESIGNATED FEDERAL OFFICIAL:

DEREK A. WIDMAYER

ALSO PRESENT:

HOWARD BENOWITZ, OGC

ANNA BRADFORD, NRO

ANDREW CARRERA, NMSS

KEITH COMPTON, RES

ARLON COSTA, NRO

SARAH FIELDS*

DARRELL GARDNER, Kairos

MICHELLE HART, NRO

PATRICIA HOLAHAN, NMSS

BRIAN JOHNSON, TerraPower

STEVE LYNCH, NRR

PATRICIA MILLIGAN, NSIR

STEVEN MIRSKY, NuScale

ED ROACH, NSIR

JOHN SEGALA, NRO

FARSHID SHAHROKHI, Framatome

ROBERT TAYLOR, NSIR

KENNETH THOMAS, NSIR

BRANDON WAITES, Southern Nuclear

*Present via telephone

C O N T E N T S

P R O C E E D I N G S

8:29 a.m.

CHAIRMAN BLEY: Good morning. The meeting will now come to order. This is a joint meeting of the Advisory Committee on Reactor Safeguards Subcommittees on Future Plant Designs and Regulatory Policies and Practices.

I'm Dennis Bley, Chairman of the Future Plants Design Subcommittee. ACRS members in attendance are Joy Rempe, Charlie Brown, Walt Kirchner, Jose March-Leuba, Dick Skillman, Mike Corradini, Matt Sunseri, and Ron Ballinger.

MEMBER REMPE: Charlie's kind of quiet today.

CHAIRMAN BLEY: And we have Charlie Brown with us momentarily. Did I skip you? No, I didn't.

MEMBER MARCH-LEUBA: No, you said Charlie was here. His name is not here.

CHAIRMAN BLEY: No, but he's -- yeah. Member Riccardella is attending the meeting via teleconference. And he is on the line. Derek Widmayer of the ACRS staff is the designated federal official for this meeting.

The purpose of today's meeting is to review the draft proposed rule, Emergency Preparedness

for Small Modular Reactors and Other New Technologies, and its associated draft Regulatory Guide, DG-1350.

The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for consideration by the full Committee.

The Committee is scheduled to address this matter at the October 2018 full Committee meeting. This service was established by Statute, and is governed by the Federal Advisory Committee Act, FACA.

That means that the Committee can only speak through its published letter reports. We hold meetings to gather information to support our deliberations.

Interested parties who wish to provide comments can contact our offices requesting time after the Federal Register Notice of the meeting is published.

With that said, we also set aside time for extemporaneous comments from members of the public attending or listening to our meetings. Both comments are also welcome.

The ACRS section of the USNRC public website provides our charter, bylaws, letter reports, and transcripts of all full and Subcommittee meetings,

including slides presented at the meetings.

Detailed proceedings for conduct of ACRS meetings was previously published in the Federal Register on October 24, 2017.

This is open to public attendance, and we have received requests for time to make oral statements from several industry representatives. Time has been allotted in today's agenda to allow for these statements.

We also have received several written statements, copies of which have been distributed to Subcommittee Members and are available for the public at the back of the room.

Today's meeting is being held with a telephone bridge line allowing participation of the public over the phone.

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

Participants in the meeting room should use the microphones located throughout the meeting room when addressing the Subcommittee and likewise,

identify yourselves and who you're with.

At this time I ask that attendees in the room please silence all cell phones and other noise making devices.

And remind speakers at the front table and this table to turn on their microphone indicated by the illuminated green light, and the button's right nearest you where it says push, every time you talk. And please turn them off when you're finished because we get interference on the phone lines otherwise.

We will now proceed with the meeting. I call upon Patricia Holahan, Director of the Division of Rulemaking Office of NMSS to make introductory remarks. Trish?

DR. HOLAHAN: Thank you. As I said ear -- or as you said, I'm Dr. Trish Holahan. I'm the Director of the Division of Rulemaking. And I'm incognito. I don't have a name tag, so.

I'd like to take this opportunity to thank the Subcommittee for allowing us this opportunity to discuss with you the Emergency Preparedness for Small Modular Reactors and Other New Technologies proposed rulemaking.

In the staff requirement's memorandum, SECY 15-0077, the Commission approved the staff

proposal to initiate rulemaking to develop alternative EP requirements and implementing Guidance for small modular reactors and other new technologies in part to reduce requests for exemptions for the current EP requirements and promote regulatory stability, predictability, and clarity to the licensing process for these future facilities.

Then in the SRM on SECY 16-0009, the Commission actually approved our rulemaking plan to move forward. The new alternative EP requirements and implementing Guidance adopt a consequence oriented, risk-informed, and performance-based approach as well as being technology inclusive.

It would provide an option to all future small modular reactor and other new technology facilities to be licensed after the effective date of the final rule.

The proposed rule does not include within its scope emergency planning preparation and response for large light water reactors, fuel cycle facilities, or currently operating non-power reactors.

However, as you will hear further from Kenny Thomas in his presentation, the Federal Register Notice has a question regarding whether the scope of the rulemaking should be expanded to include other

facilities such as large light water reactors.

The --

CHAIRMAN BLEY: Can I interrupt you? I'm sorry to interrupt your opening statement.

DR. HOLAHAN: No.

CHAIRMAN BLEY: That part's kind of new to me. Where did that come? The consideration for large LWRs?

DR. HOLAHAN: It came about through the concurrence process. There was a question because SECY 15-0077 wasn't -- didn't clearly articulate why we couldn't include light water reactors.

CHAIRMAN BLEY: So that will be considered during the rulemaking?

DR. HOLAHAN: Well, we'll ask a question.

CHAIRMAN BLEY: Okay.

DR. HOLAHAN: Yeah.

CHAIRMAN BLEY: Thank you. Go ahead. I'm sorry.

DR. HOLAHAN: Okay. The associated draft implementing Guidance performance-based emergency preparedness for small modular reactors, non-light water reactors, and non-power production or utilization facilities is intended for use by licensees, applicants, and the NRC staff.

The draft Guidance describes optional approaches and methods acceptable for implementing the new alternative EP requirements in 10 CFR 50.160, Emergency Preparedness for Small Modular Reactors, Non-Light Water Reactors, and Non-Power Production, or Utilization Facilities.

As Guidance document DG-1350 does not establish additional requirements, and licensees are free to propose alternative ways for demonstrating compliance with the regulations. And Kenny will be discussing this draft Guidance document in further detail during his presentation.

We look forward to addressing any questions or comments that you may have on this SECY paper, the Federal Register Notice, which includes the proposed Rule and statements of consideration, as well as on the Guidance documents, DG-1350.

Before I want to -- before I introduce the staff, I want to mention that the draft proposed Rule is on track to be submitted to the Commission for a vote on October 12, 2018, prior to issuance for public comment. Andy will provide you with further details regarding the rulemaking deliverables and schedule.

I'd like to especially acknowledge and express my appreciation for the efforts of the Working

Group Members. For all of their excellent work involved with this rulemaking effort.

Several members from NRR as well as Research, NSIR, NMSS, and NRO are here this morning to support this presentation. Including Kenny Thomas, who's an Emergency Preparedness Specialist in the Office of Nuclear Security and Instant Response.

He will be leading the discussion regarding the proposed rulemaking and draft Guidance document. Andy Carrera, the Lead Project Manager for this rulemaking, from my division in NMSS will close the presentation with the upcoming deliverables.

And additionally, we have members of the Working Group. And key -- and Office of New Reactor, Office of Nuclear Security and Instant Responses, NMSS, and Office of General Counsel management and staff, including Ed Roach, Ed is in the audience.

And I forgot to mention Arlon Costa, which is a Senior Project Manager from the Office of New Reactors. Sorry Arlon. And Keith Compton from the Office of Research, in addition to address any questions you may have.

We look forward to an informative interaction with the ACRS staff today. I want to thank the ACRS for its review and support to the staff

with regard to this important rulemaking activity.

And now I'll turn it over to Arlon.

CHAIRMAN BLEY: Before you do, I have one quick thing I wanted to get in. First, there are two areas that I couldn't quite track, and I didn't have time to chase down all the way.

DR. HOLAHAN: Okay.

CHAIRMAN BLEY: But I hope people will address as we go forward. The one is, it seems to me the most difficult thing about being able to do this well would be to get the source terms right.

And near as I can tell, there's only hints that you've got to do that. Or short statements both in the Rule and in the draft Guide. Which doesn't tell us much about how to do that.

And I hope you can expand on that later in the morning.

DR. HOLAHAN: Okay.

CHAIRMAN BLEY: The other one is, I'm not completely clear. I'm not clear, what's different in the proposed Rule and the Guidance for the other aspects of 70-EPZ that's different from Appendix E?

And most of that -- most of the Guide deals with what's in the Emergency Plan. And if you can highlight things that are different from the old

Guidance, that would be helpful to me especially.

So, with that said, I'd like you to go ahead --

DR. HOLAHAN: Okay.

CHAIRMAN BLEY: With Ken. It's up to you.

DR. HOLAHAN: I'll turn it over to Ken.

MR. THOMAS: Good morning. Thank you Dr. Holahan, I appreciate it. I am Kenny Thomas and I will be leading the staff's presentation this morning.

I'd like to thank the Working Group again, and the project managers for all their efforts to get here. And this presentation will provide you with the key messages, background, and objectives and a detailed look at the Rule and Guidance.

We will discuss the reasons why the staff did not address operating reactors as Dr. Holahan had discussed, on slides four through six. That the NRC is okay with the site boundary EPZ on slide seven.

How the EPZ will be calculated on side seven and eight. The reasoning that informed the ingestion planning requirements on slide 11.

And offsite planning considerations on slide 12. Next slide, please.

The proposed Rule would be technology inclusive. And we provide an option to all future

small modular reactor and other new technology facilities licensed after the effective date of the final Rule.

The proposed Rule would address those nuclear facilities that have source terms, and by extension, reactor power levels ranging from very small too large.

For the sake of convenience, we will use the term other new technologies in this presentation and in some of the associated documents to refer to non-light water reactors, medical radioisotope facilities, and future non-power reactors.

However, in the Rule and the Guidance, we don't refer to other new technologies. Rather, we use non-light water reactors, or non-power production or utilization facilities.

In the context of this proposal, medical radioisotope facilities to be licensed under 10 CFR Part 50, would also be included within the definition of non-power production or utilization facilities.

This Rule proposed to apply the Commission's expectation that advanced reactors would provide enhanced margins of safety and/or use simplified inherent, passive, or other innovative means to accomplish their safety and security

functions. Next slide, please.

MEMBER SKILLMAN: Before you proceed, Ken --

MR. THOMAS: Yeah.

MEMBER SKILLMAN: Let me ask you this. I've reviewed the documentation. And DG-1350 does not include ONT. Does not include that effort.

I'm not suggesting that it must. But, I'm wondering if an opportunity is being lost? What you've just said is, you're going to include ONT under the definitions of in-house or non-production, smaller facilities.

As I was reading all of the documentation, my sense was that the term ONT delivered a punch that was worth continuing with. I thought there was value in that acronym. Because at least in my mind it was offering a view of something different that needed recognition.

So, I would suggest you might want to rethink simply writing a definition that includes ONT under something else. When in actuality the term, or the acronym ONT might be one that takes on its own value.

One man's opinion. We're a subcommittee here. But that's -- when I read 1350, I said where's

ONT? Because you make a great defense of it in your other documentation.

MR. THOMAS: Thank you Dr. Skillman. We will take a look at this and we'll consider it. I will let you know that when we kicked this off about three years ago, we set out to identify those power plants within the scope, small modular reactors and other new technology.

In 15-0077, or SECY 15-0077, we discussed what those could be, medical radioisotope facilities and non-light water reactors. When we come together as a Working Group to start looking at the construct of the Rule, how do we go around and try to define this?

So, we went through a very deliberative process. And that's something that we can reconsider as we move forward with crafting the final rule.

And I have a note of it, we will reconvene the Working Group and take a look at it. It's valuable insight. Thank you.

MEMBER SKILLMAN: Thank you. Thank you.

MEMBER KIRCHNER: May I -- at the risk of regression, go back to the previous slide. And just a -- I'm stumbling over your choice of words.

So, an SMR is less then 1,000 megawatts

thermal that may have a modular design. What do you mean by that?

MR. THOMAS: Yeah. When we were looking at -- again, we're looking at small modular reactors. And one of the questions that we tried to tackle in the Working Group as a technical group is, so if we had a small reactor come in, would this not apply to a small reactor as well?

So, when we start looking at putting the definition, as you'll see in the Rule language in the Federal Register Notice, we said we could have, or may have modular design as defined in Part 52.

So, it was important for us to acknowledge that even if a small reactor came in with a small source term, smaller consequences, or less consequences to public health and safety, why wouldn't we want to include that?

So, some of the -- what we looked at is maybe squishy language there. May have modular design is our attempt to address even the small reactors that may want to use this as other new technology.

So, a small reactor --

MEMBER KIRCHNER: That makes sense. That's not what I'm reacting to. I'm reacting to 1,000 megawatts is a change in definition from

previously what was used for SMRs.

And you don't address multiple units explicitly.

MR. THOMAS: Okay, so --

MEMBER KIRCHNER: Therefore you could have more then 1,000 megawatts on the site. Thermal. And we have that actually in front of us.

MR. THOMAS: It's that path right there.

CHAIRMAN BLEY: Well, in some of the documentation they say this 1,000 megawatts applies per module.

MEMBER REMPE: And that's what I was going to bring that up. I mean, what's the limit here? How many -- if you have an 800 megawatt thermal reactor and they put 12 on a site, are you still going to do per module?

MR. THOMAS: That's correct.

MEMBER CORRADINI: So, I was going to wait, but since we're not going to let you get off slide number two.

(Laughter)

MEMBER CORRADINI: So, I'm trying to understand the technical bit. Let's just -- let's just stipulate for a moment that they're all independent.

So, 1,000 megawatts per module. Just for the sake of argument. Where is there a calculation that shows 1,000 megawatts is the breakpoint?

I'm back at TID-14844, which is not appropriate, because it's reciting and it's expounded. But I'm looking for a calculation for a light water reactor that shrinks, and continues to shrink.

And 1,000 megawatts is the breakpoint before changing the peg from automatically ten miles to less then ten miles. Is there such a calculation?

Use the alternative source term using TID-14844, using anything.

MR. THOMAS: I'm going to call my --

DR. HOLAHAN: Lifeline?

MR. THOMAS: My lifeline. Yeah, exactly. Thanks Trish. Dr. Compton, will you -- are you able to address this?

Or can we take this as a note to follow up with the ACRS?

MEMBER CORRADINI: And I'll explain my logic. My logic is I personally know how you guys have structured this from a process standpoint make's sense. I don't have a problem with that.

I'm just back with Dennis on source term, source term, source term. Because it's going to be

used for citing. It's going to be used for emergency planning.

It's going to be used for equipment qualification, control room habitability. It maybe used for all of these things or they maybe different source terms.

So, I just want to understand the technical basis of the breakpoint. And I assume somebody did something to justify that.

CHAIRMAN BLEY: Or is it just the biggest one you thought you might have to see?

MEMBER CORRADINI: Don't give them that.

CHAIRMAN BLEY: Because that's technology neutral.

MR. ROACH: Good morning. Ed Roach. I'm a Senior EP Specialist in NRC at NSIR. When we started the rulemaking, existing rulemaking had already been completed in the Fee Rule.

And the Fee Rule had in Part 171, had previously defined it. And NRO, I believe, worked with the offices to define it as a 1,000 megawatt thermal.

And it also had the words, I think, equipment to 300 megawatts electrical deposit.

CHAIRMAN BLEY: And any basis?

MR. ROACH: We searched for that through the Federal Register, and didn't pull that out. However, in looking at the various designs that were out there, there were discussions relative to where do you make that cut?

Previously the Rule and the current Rule states 250 megawatts thermal as the -- as where plants, light water reactor or light water is less then that, or high temperature gas reactors can come in for a case by case evaluation. And the ones that have previously been there have had about a five-mile EPZ.

So, off the top there is not a hand calculation that I can give you right now. But we'll pull that.

MEMBER CORRADINI: And the only reason I'm asking for it now as -- since the context is the way you've structured the Rule, you've basically, thou shall go find a source term.

I'm just trying to understand. Because this is going to affect a number of things.

MR. ROACH: Yes.

MEMBER CORRADINI: And I guess we're a technical committee, so I'd like a technical basis rather then a legal basis.

MR. ROACH: Okay.

CHAIRMAN BLEY: Mike said don't leave you an out. But I'm of the persuasion, --

MEMBER CORRADINI: I'm sure you are.

CHAIRMAN BLEY: That what Trish said earlier is appropriate. There's nothing I read here in the process that says this wouldn't be appropriate for any reactor or any size.

We have a shortcut now both for these details. But, if you want to go through all the details it seems to me it's a reasonable approach for any.

Although the hard part has been left out so far.

MR. SEGALA: And this is John Segala from NRO. I would just like to add, I mean, this is just designating, you now, who can apply the new Rule.

In the end they have to demonstrate through calculation and analysis, applying their source term and the different accidents. They have to demonstrate that they can meet the performance criteria or the acceptance criteria in the Rule to have a relaxed emergency planning zone size.

CHAIRMAN BLEY: I think we get that. But our question is, why? Where did this come from?

What's the basis for saying these are the people this applies to?

MS. BRADFORD: Can I jump in for one second? This is Anna Bradford.

CHAIRMAN BLEY: If you say who you are.

MS. BRADFORD: Yeah. Anna Bradford, Deputy Director in the Division of Licensing, Siting, and Environmental Analysis at NRO.

And I was also back in the old Division of Advanced Reactors and Rulemaking. You remember that in NRO. We had all the SMRs, NuScale, Westinghouse, MPOWER, Voltec.

So, the small modular reactor, 300 megawatt electric, which converts to about 1,000 megawatt thermal, was just a term that we were using back when this whole kind of category of reactors came up in the first place.

It really just meant to me this category of this type of design of reactor. And the Industry was using this term.

You know, we're aiming for under 300 megawatt electric per module. So, that's -- it just became more of an okay, given that there's this category of potential designs out there, could they be eligible for a smaller EPZ?

So to put it in five that the 1,000 came up strictly when we started working on EPZ. It's been used as kind of the term of art or the name for this category for years, and years, and years, before we started using EP.

And so you'll see this later, I think, when we get into the details. And certainly this afternoon when we start talking about specifics, you'll see how we applied that to actually calculate the source term. Because of course the source term is what's most important regardless of what you call it.

CHAIRMAN BLEY: Okay. There's a rule people say here. If you get ten seconds, just go ahead.

MS. BRADFORD: Okay.

MR. THOMAS: Okay, so we're back on slide three if you're following along in the audience or on the phone lines.

Let's see. Major provisions of this proposed Rule and Guidance would provide for an option to all future small modular reactors and other new technology facilities.

A new alternate performance-based EP framework, including requirements for demonstrating effective response and drills. And exercises for

emergency and accident conditions.

A hazard analysis for any NRC licensed or non-licensed facility contiguous for a small modular reactor or other new technology facility to identify hazards that could diversely impact the implementation of the emergency plans.

A skillful for approach for determining the size of the plum exposure pathway emergency planning zone. Or as we'll keep referring to it as the EPZ.

A requirement for licensees to describe ingestion response planning in the facility's emergency plan. Including the capabilities and resources available to protect against contaminated food and water from entering the ingestion pathway.

These requirements were applied to those small modular reactor and other new technologies that elect to use the rule in Section 50.160. It's the new section for us. Next slide, please.

In this on the next slide, it will try to provide some of the background. Dr. Holahan looked at it just a few minutes ago. She spoke to it and gave the context for some of the decisions to pursue rulemaking for small modular reactors and other new technologies.

In 2010 the staff sent to the Commission SECY 10-0034, where the staff presented the potential policy, licensing, and key technical issues for small modular reactor designs.

At that time the staff told the Commission that the staff would consider white papers, topical reports, and other information it received from the Department of Energy and applicants to evaluate proposals for site specific proposed emergency plans. The staff also noted its commitment to work with the Federal Emergency Management Agency, FEMA.

In 2011, in SECY 11-0152, the staff presented one solution to the policy and licensing issues described in SECY 10-0034 for emergency preparedness. This paper describes the staff's intent to develop a technology neutral, dose based, consequence oriented EP framework for small modular reactor sites that takes into account the various designs, modularity, and co-location as well as the size of the EPZ.

Also in 2011 we had a final Rule. It was published to enhance the EP requirements. Then the following years the existing power plants implemented provisions of the final rule, enhanced their capabilities learned from the Fukushima Daiichi

accident.

In 2014 --

MEMBER KIRCHNER: May I stop you again?

MR. THOMAS: Yes, sir.

MEMBER KIRCHNER: You started out in studying this and all the background material, has there been any analysis by the staff of why this is restricted to singular modules, given the Fukushima events?

MR. THOMAS: Analysis?

MEMBER KIRCHNER: In terms of a single module being the basis for making the dose estimate?

MR. THOMAS: That's a good question. I believe that we're in a -- we're using research to actually identify what the source terms are in the sensitivities of the different accidents that --

MEMBER KIRCHNER: I mean, Fukushima in short was a lesson in common mode and common cause failure.

MR. THOMAS: Yes, sir.

MEMBER KIRCHNER: So why post-Fukushima would we not look at multiple modules?

MR. THOMAS: I believe we are, sir. I'm going to turn this over to Dr. Compton.

DR. COMPTON: Keith Compton from the

Office of Research. Yeah, strictly -- I'll just speak strictly to the doses estimate methodology.

I haven't -- we haven't kind of developed that to be strictly limited to a single source term. So, if you had a multi-sourced term, if you generated that, that was something that came out of your analysis, you could.

MEMBER KIRCHNER: So for your bounding source term in a severe accident, would we use a source term based on multiple modules or a single module?

DR. COMPTON: I haven't -- we haven't, or at least I haven't in the methodology specified exactly how to do that.

MEMBER REMPE: Didn't you say in the Rule that you are doing it on a single module? I mean, that's what I was trying to get to earlier with my question.

And I agree with Walt, why are you not considering multiple modules on a site? Why are you doing a single module?

The other question I was curious about was --

MEMBER KIRCHNER: It's not a technical decision then it's a policy decision.

MEMBER REMPE: If it's a policy decision, I'd like to understand that. And the other question I have is why 96 hours?

A long time ago we used to use the first two hours for siting. And they decided with some of the advanced designs that the worst two hours should be used.

Now if we have 96 hours again, we don't know what designs are going to come through in the future. So what happens if somebody has a pool of water that boils away?

All their modules are in, and again, I'm not picking on a particular design. I'm trying to think of Joe's reactor that a former member used to always mention.

If there's a bump up at 100 hours because that water boils away at 97 hours. And you know, again, should you not have something more then 96 hours?

I'm just curious again, why 96 hours? And that was mentioned in the Rule, the draft Rule.

MR. TAYLOR: If I can, I'm Robert Taylor, Branch Chief in NSIR Division of Preparedness and Response.

To address the multiple source term and

such. The methodology for EPZ size determination talks to source term.

But it talks to also the accident conditions that occur at the site, which would need to make considerations for multiple co-located facilities on the site. Which would include other source term sources essentially. Where they can come from.

So, it's not restricted to only the module that's being licensed at the time. It would be any design accident that the applicant would be including in their analysis, which would include accidents of multiple facilities at the site, multiple modules.

MEMBER REMPE: I saw that word and I thought about well, they must be thinking about the spent fuel pool. But I kind of found the good --

MR. TAYLOR: The spent fuel pool and other modules, and other types of facilities not restricted just to the same type of reactor.

MEMBER REMPE: I agree that you might be able to interpret the verbiage in the draft Rule so that it would be that way. But jeepers, we're talking about small modular reactors in this rulemaking.

We might not be a little more explicit, because it's real vague that that -- and you know, I was trying to read it. It's like are they considering

multiple modules or not?

It wasn't clear to me. And again, I spent some time trying to understand it. But maybe I'm not a lawyer or I didn't see another one.

MR. TAYLOR: We don't want to restrict it to just the additional modules that maybe present at the site. We wanted to make it general in nature to include other sources of source terms.

MEMBER REMPE: Okay. So, put in purposing --

MR. TAYLOR: Which would include the commonality of a spent fuel pool --

MEMBER REMPE: Um-hum.

MR. TAYLOR: Between modules and the reactor at the same time modules. So, that would be an analysis and would be based upon the credible accidents that occur at the site, in the analysis that the applicant would provide to us.

MEMBER REMPE: It looks like you could put a parenthetical statement saying this is what --

MR. TAYLOR: A little bit more precise?

MEMBER REMPE: Yeah. A little more common college that -- or easier to understand language would have been helpful to me.

But again, I'm an engineer.

MEMBER CORRADINI: So, can I take a little bit different question? Is the anticipation of staff that the source term an applicant may use to insert into this process the same source term that would be used for siting?

MR. COSTA: Let's go back to siting first for a second. If you recall, in siting we have the measurements have to do with specifically for siting.

And in the part of siting that's associated with EP, is how you're going to deal with the capabilities to move people away from the zone. So, that number is very high as you recall.

So the one rem number that we're talking about here is, she mentioned the 96 hours, is way more -- is much smaller then the one in comparison to the site.

But, for our rule it's specifically for emergency preparedness. So it's not associated with that number for siting.

MEMBER CORRADINI: Okay. So, is that a yes or a no? I'm trying to understand. In other words, if I today am going to apply for I'll Joy's and a former member's, Joe's reactor.

And Joe's reactor is coming in, they're going to have to develop a source term for a number of

applications. My main question is, is the siting source term expected to be the same source term as for the EP?

MR. COSTA: The rule that we have right now for siting is much -- the number, the 25 rem number, if you compare that to the one rem, is much smaller.

So anybody that makes -- meets the siting criteria of 25 rem in comparison to the one rem for 96 hours that we have for EP, it's pretty obvious that they make it for the emergency preparedness measurements.

MEMBER CORRADINI: Okay.

MR. COSTA: Which is much more strict then the siting number.

MEMBER CORRADINI: Are you going to put a lot of that to her for reference?

MR. THOMAS: We also have Michelle Hart from the Office of New Reactors standing by to answer.

MS. HART: Yes. As Kenny said, I'm Michelle Hart in the Office of New Reactors. I do the siting analysis, and I've also been on the Working Group for this Rule. Proposed Rule, excuse me.

The source terms that you're talking about, there's not just one source term. For the

emergency preparedness, there's a range of accidents that they need to look at.

It may include, it should include the source term that they use for siting. So that design basis accident source term would only give credit for safety-related equipment.

But all of these accidents would be like severe accidents, wouldn't include it.

MEMBER CORRADINI: So the -- so from your experience, the one for siting may not be the bounding one. There would be --

MS. HART: That's correct.

MEMBER CORRADINI: Okay. Okay. All right. Thank you.

MS. HART: Okay.

CHAIRMAN BLEY: Okay.

MR. THOMAS: Ten second rule I guess. Okay. In 2014 we're somewhere around the last bullet on this slide.

In SECY 14-0038, the staff stated that a performance based over site regime could simplify EP regulation of focused inspections. More fully on, response related performance rather then the current focus on plant maintenance and compliance.

However, the staff recognized that the

existing programs provide reasonable assurance and protection of public health and safety. Therefore, the staff recommended at that time that the current EP regime for existing facilities be maintained.

This rulemaking was based on the earlier work presented in these SECY papers. The Working Group addressed the issues related to modularity, the designs, the potential for co-locating the reactors near industrial facilities, and the size of the EPZ. Next slide, please.

Continuing with some of the background on slide five. In the staff requirement's memorandum to SECY 14-0038, which was published in September 2014, the Commission approved the staff's recommendation not to pursue rulemaking for implementing the performance based EP framework for operating nuclear power plants.

Additionally, the Commission stated that the staff should remain vigilant in continuing to assess the NRC's EP program. And should not rule out the possibility of moving to a performance based frame work in the future.

The Commission also noted the potential benefit of a performance based EP regiment for small modular reactors. The staff should return to the Commission if it finds conditions warrant rulemaking.

A few months later in April 2015, the staff sent SECY 15-0077 to the Commission to request initiating rulemaking to revise the regulations and guidance for EP for small modular reactors and other new technologies such as non-light water reactors and medical radioisotope facilities.

The staff proposed a consequence-based approach to establish new requirements as necessary for offsite EP. And to establish EP requirements for small modular reactors and other new technologies that are commensurate with the potential consequences to public health and safety.

The EP for small modular reactors and other new technologies, including addressing the EPZ size would enable the NRC staff to develop regulations and guidance to provide for regulatory stability, predictability, and clarity in the licensing process. And would minimize or eliminate the uncertainty for applicants and the inefficient use of agency resources caused by reliance on serial EPZ size exemption requests.

The staff requirement's memorandum to SECY 15-0077, the Commission approved the staff's request to initiate rulemaking for small modular reactors and other new technologies. And stated that the staff

should keep in mind the Commission's previous direction from the SRM for SECY 14-0038 in mind.

This rulemaking began in 2016, and the Commission approved the staff's proposed schedule in SECY 16-0069. Next slide, please.

So here we're addressing one of the questions where the staff's attempting to address what about the operating reactors? And one of the questions I believe from Dr. Corradini earlier is what is -- where did this come from?

So, -- or Dr. Bley, sorry. The existing regulatory oversight program provides reasonable assurance that public health and safety is protected.

Given the recent to EP regulations and guidance, such as the enhancements to the EP final rule in 2011, and the Near-Term Task Force recommended action and lessons learned implemented by the industry developing and implementing a rule with the resources from higher priority projects for both the NRC and for the industry.

So, we did not address operating reactors within this Rule. Next slide, please.

CHAIRMAN BLEY: Ken, if I recall, in one of the documents I read, the argument for that was it just would be too much of a burden for an existing

reactor to even consider this at this point.

Is that right? Is my memory correct?

MR. THOMAS: We did make that case in the documents.

CHAIRMAN BLEY: Yeah.

MR. THOMAS: In the regulatory basis, I believe. And in the FRN we talked to it again.

CHAIRMAN BLEY: Yeah.

MR. THOMAS: It was based on the input in the public meetings that we had with the industry. We've had two public meetings with the industry.

One in August 2016 when we addressed or asked the question whether a performance based rule would be beneficial for small modular reactors, as the direction we should go.

And again, when we published the draft regulatory basis document in May 2017, we had a public meeting that also addressed this. So, it's based on the interactions that we did have with the industry.

And they felt at that time it would be too costly to actually change to a new program when the existing program provided reasonable assurance.

CHAIRMAN BLEY: Thanks.

MEMBER KIRCHNER: For clarification, was that the NEI comment that you referenced in your

previous paragraph?

MR. THOMAS: That's a -- that's a good question. NEI did make a comment to us when they were -- we were soliciting public comments on the draft regulatory basis.

About expanding the scope of the rulemaking to include operating reactors. At that time when we were -- and we have a slide that actually addresses this at some point.

At that point we initially felt that that comment was out of scope. Because we felt that the scope was established by the SRM to SECY 15-0077, go out and do rulemaking for SMRs and ONTs.

Based on what we learned during the concurrence process for this set of documents, it was raised by individuals who were reviewing it. And it's like there's nothing in this rule that would not apply or could not conceivably apply to large light water reactors or the operating fleet.

So, we're revisiting that by including a question in the FRN about including them within the scope of this regulation.

MEMBER KIRCHNER: Thank you.

MR. THOMAS: Okay. Next slide please. Slide seven. Discussing the scalable approach for

plume exposure pathway, EPZ.

The EPZ size would be scaled in proportion to the potential consequences in a similar manner as the NRC uses for operating research and test reactors for fuel cycle facilities and independent fuel -- spent fuel storage installations under the existing rules, since it would be a consequence oriented approach to provide the same level of protection to the public, health and safety as afforded to other facilities.

Next slide, please. The staff is proposing that applicants who select to comply with the new Rule provide an analysis that supports the request the EPZ size. The requirements would be in Sections 50.33 and 50.34 of 10 CFR.

For the EPZ size determinations, the size of the EPZ would encompass an area where prompt protective actions such as evacuation of sheltering, maybe needed to minimize the exposure to individuals.

If the applicant or licensee demonstrates that prompt protective measures are not required due to the timing of the releases from a credible accident, or that extended time exists after release and prior to reaching the need for evacuation or sheltering such that the state and local authorities

could initiate actions in sufficient time to adequately protect the public health and safety, such accidents maybe excluded from consideration in determining the size of the EPZ.

If the proposed EPZ extends beyond the site boundary, then the exact size -- sorry, the exact shape of the EPZ would need to be determined in relation to the local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. Next slide, please.

Slide number nine. The existing EPZ Guidance for nuclear power plants. Large light water reactors use a variety of guidance documents in support of their EP programs.

Among the various documents I'm discussing NUREG-0396. 0396 provides the basis for federal, state and local emergency preparedness organizations to determine the appropriate distance for which emergency response planning efforts around a nuclear power plant.

It introduced the concepts of a generic emergency planning zone as a basis for planning the response actions that would result in dose savings in

an event of a serious power reactor accident.

These concepts were included in the final Rule in 1980 in Sections 50.33, 50.47, and in Appendix E to Part 50. And required a ten-mile plume exposure pathway EPZ, and a 50-mile injection pathway EPZ around each nuclear power reactor. Next slide.

MEMBER REMPE: Excuse me. In the draft Rule, you mentioned two documents, ML 18064A317 and ML 18114A176 that are not available on the public NRC website.

Some of the information in those documents is included in the draft Guide in Appendix A. But, are you planning to issue those before the draft Rule becomes public? And what's their status?

MR. THOMAS: I'm not sure. Dr. Rempe, could you repeat those ML numbers for me?

MEMBER REMPE: Sure. ML 18064A317 and ML 18114A176. That's on the bottom of page 78 and 79 and -- the top of page 79 of the draft Rule. Generalized dose assessment methodology for forming emergency planning zone size determinations and required analysis for informing emergency planning determinations.

CHAIRMAN BLEY: Keith's an author on these.

MEMBER REMPE: Yeah. You know which documents I'm talking about folks?

(Off mic yeses.)

MR. THOMAS: Dr. Compton is --

MEMBER REMPE: And you actually quote things in Appendix A of the draft Guide.

DR. COMPTON: Yeah. I think those documents are complete and they can be -- or filed as public.

MEMBER REMPE: Okay. Thank you.

MEMBER SKILLMAN: Ken, I would like to ask this question, please.

MR. THOMAS: Sure.

MEMBER SKILLMAN: As I look at this slide, and I've got a pretty good understanding of how large a power plant executes under this NUREG.

MR. THOMAS: Yes, sir.

MEMBER SKILLMAN: The get done track for the emergency preparedness organization at the site is the accumulation of the EALs. You begin with them.

And you go event, you get an alert. You get a site area emergency. And when you see radiological conditions further decaying, when you push that button to go to general, you realize that you're evacuating schools and nursing homes and

hospitals.

That is a big, big deal. So, at this time I'm look -- I'm listening to your presentation. I've looked at the background documents.

And I'm looking at Draft Guide 1350, and I'm thinking about EALs. What is your thought, and this is just a general question.

What's your thought about EALs when the source term is low and the offsite release is also very low for some of these ONTs?

And how do you develop EALs when there is almost nothing to deal with?

MR. THOMAS: Well, I believe that we have several models that we could use for that or the industry could take a look at. We have a --

MEMBER SKILLMAN: Has the industry responded to that? And they said hey, you know, that you've got -- you've got technologies here where the source term is so very, very low, we're not really sure how to develop an EAL for this.

MR. THOMAS: We have not engaged the industry at this time to address that specific question. But within our own documents and within our own constructs, if we were to look at NUREG-0849 for research and test reactors, there's an EAL scheme

there.

We've endorsed ANSI Standard 1516 that also has an EAL scheme that for really small source terms, for those type of facilities. I'm not the expert on that.

I could ask Mr. Lynch to address that as well. But, we do have the different models for -- that does address emergency classification levels and EALs for these types.

What we do expect from the rule, as you look at the -- in the FRN, the proposed Rule, is that they have to be able to classify the event.

So again, that's when the bells and whistles start going on. And that's when the plant needs to be thinking that they're in an emergency situation. They have a condition that meets their initiating condition.

We expected the various designs to have different EALs. One size will not fit all.

If we look at NUREG-0654, there's a set of EALs that we published in NUREG-0645. And those EALs for large light water reactors have evolved quite dramatically in the 40 years that we published NUREG-0654.

And I think we're in rev six of NEI 99-01.

And so it -- they can vary from -- based on the operating experience for the industry that we felt was of major importance back in 1980 through the various revisions, they've refined where those emergency classifications and those EALs fall.

In order to support this Rule, to implement this Rule, the industry and then specific to designers will have to actually evaluate their plants and determine what their EAL list is.

We give a template in the DG that kind of -- if you look at the existing ones, the abnormal radiological conditions, you have to be able to address those.

The hazards. What are those hazards? And that might be where the hazard analysis from contiguous plants, those EALs maybe incorporated in that. And there are analyses for those adjoining contiguous plants need to be able to address that.

You know, equipment malfunctions. If you have a design that relies on, you know, AC, DC, or specific ECCS, those casualties have to be addressed on your emergency classification scheme, the EALs and initiating conditions.

And then your radiological barriers, fission product barriers in the current scheme. We

would expect something analogous or very similar to that for plants.

For the technical staff, we look at a whole range and spectrum of different plants and designs from the light water, small modular reactors to small reactors to sodium fast reactors, molten salt reactors with vacuous fuel.

So, developing those specific EALs was not our intent for the Working Group. What we wanted to do is follow what we were instructed to do, was to be technology inclusive.

And then for the specific designs to come in and describe your design. And then much like your experience, you look at this and this doesn't make sense.

The staff would also have to go, did you look at abnormal radiological conditions? Did you look at equipment malfunctions?

Did you look at whatever your fission product barriers is? Is there a loss of containment?

For a sodium fast reactor, there's a containment function as opposed to maybe a metal building. So, the EALs is where it starts.

It's the one EPIP, the emergency planning implementing procedure that you never leave. You're

always in your classification procedure from the day you start your program.

You know, I can't as an operator person, I can't just close the book because it's -- that's the one procedure. I'm always scanning.

My reactor operators are always scanning to make sure that we're in that -- in the right place. Operating in the right place.

And when it's not, I'm familiar enough with that procedure and my EALs to immediately go there. So, personally, based on my experience, EALs is fundamental.

For today, for tomorrow, in the past, it's that important that we address and try to give those considerations in the draft Guide.

MEMBER SKILLMAN: That's sufficient. Thank you very much. Thank you.

MR. THOMAS: I could talk about it all day.

(Laughter)

CHAIRMAN BLEY: I wanted to sneak in a question related to what was going on just before that.

Those two papers were brought up, and they aren't public yet. It sounds like they will be soon.

MR. THOMAS: Right.

CHAIRMAN BLEY: Those papers, like all the other Guidance and like everything else I've read, have an icebox. And as Michelle said, you've got to do the source terms, you've got to do some area specific source terms.

But so far we've got no guidance on how you want people to do that. Do you anticipate developing such guidance into the draft Reg Guide before it's published?

Or are you leaving this up to the poor folks who are going to have to send you a lock?

MR. COSTA: This is Arlon Costa. The Guide that we have right now, it's overarching. So, it's the big picture for the whole group.

CHAIRMAN BLEY: It hints there will be something on source terms.

MR. COSTA: Right. So, because this is technology inclusive, we expect that, well, right now we don't have any application for some of these newer technologies that we're talking about, like molten salt reactors or the other one.

So, there will be a time when we're going to have to address that. But, the Guide --

CHAIRMAN BLEY: Yeah. I wasn't asking for

an example. I was asking for guidance on how to actually do those calculations.

MR. COSTA: Right. That will be there. When we come to specificity, we may need to develop a new Guide for those specific types of reactors coming our way.

MEMBER CORRADINI: But I think what Dennis is asking is, why in advance -- well, I mean, if I were an applicant, I'd like to know way in advance some general guidance to know what I have to throw over the fence--

CHAIRMAN BLEY: Right.

MEMBER CORRADINI: Before I throw it.

MEMBER REMPE: For example, a cut off frequency.

MR. THOMAS: That's the exact same questions that the Working Group and the Steering Committee have been tackling. And then whether to talk specifically to what's gone on recently with the licensing.

We had two vendors who came to us in early discussions prior to the licensing. And the staff developed what we call design specific review standards.

We do envision that process continuing

forward. And we've engaged those individuals in NRO to find out if that's a feasible process to moving forward, as a design is going through its design phases.

Hopefully the vendors come to us and talk to us early enough to where we're starting work. We get the information. We start looking at the standard of review plan, NUREG-0800.

And we look at this Guidance and say what do we need to do to address those specific reviews and those specific contest via application?

CHAIRMAN BLEY: I must not be speaking clearly. What I'm looking for is comments in principal on how one does this.

What considerations need to be worked out? What kind of calculations need to be done? Not what's the specific source to input in a particular reactor.

And that's missing. And part of my concern is some vendors are deeply, technically competent and know what's involved here. Others maybe not on this area.

And with no guidance at all, it's -- it smells like a trap. You know?

MEMBER KIRCHNER: If I could add in here, I think you underestimate how difficult this is to do.

And since that view graph is up, if you go back, I have it with me.

They -- the task force that did 0396 did what I thought, and I'll use their words, the prudence approach. That remember this was done before TMI and before Fukushima. In the late '70s.

And they realized then, even for the commercial LWR fleet, which is much more mature then than any of the advanced designs we're thinking about now. That they couldn't bound the possibilities.

WASH-1400 had just been issued a couple of years before. So they took that in consideration. And then they stepped back from that.

And I think it's relevant, if you'll indulge me, Dennis, the Task Force recognized that more specific events with respect to acts and incidents, consequences would be more severe then design accidents, should be explicitly considered in the process.

And that emergency response plans should provide dose ABs for a spectrum of accidents that could produce offsite doses in excess of the PAGs. And that the planning basis is independent of a specific accident sequence.

And then they went onto reference the

reactor safety study. And then they fin -- they concluded that in the Task Force's judgement that offsite planning for a generic distance around a nuclear power plant is prudent and useful.

And that's because they recognized the difficulty of covering the spectrum of accident sequences that could -- that could occur.

Now we're dealing with new designs that don't have the maturity or the PRA base that -- and won't. Because many of them are paper designs.

So you're not going to have the confidence. The uncertainties are going to be large.

So now if we go to the first principal source term calculation, the uncertainties that propagate through that calculation are enormous.

It's almost like compound interest when you go through and see how your uncertainties grow in trying to get your arms around a spectrum of source terms that you could have from the many accident scenarios.

And so with the slide up there, I wanted to ask you what you believe is the prudent approach given that you're stance of technology neutral right.

Would you not fall back on some minimum take the source term which the first order correlates

with the power level? And then back out a bounding set of calculations based on a worst case.

And then would you not come back to exactly where the Task Force wound up? That's how they came up with the ten miles by the way.

There is actually some -- there is some actual technical basis for that. They looked at a large spectrum. And then they looked at the fall off with distance and weather conditions.

And then that's where the ten, you know, the ten miles came from.

MR. THOMAS: Right.

MR. COSTA: And what you've said is our expectation.

In fact, this is the point I was trying to explain to Dr. Blue about the guidance that we have general picture of what the Applicant of licensee will have to do, something similar to exactly what you said.

And that's why in our general guidance that we have right now, which is technology inclusive, we even provide a figure where we start with a source term, we identify the release scenario, evaluated the source term information, as described in the instruction that we give, and then we go to the next

step.

What's the meteorological data development that you're going to have, and then the following one is what are the atmospheric transport models that you're going to need, and then what is the exposure model, and then the dose estimates that you have to do, and also the probabilistic dose aggregations that you have to have.

So, we understand precisely what you said so this guidance is thinking technology inclusive and we need to address that. That's just the fact.

MEMBER REMPE: So what you're saying is in Appendix A of the draft guide and it was in those two documents that aren't public, but when I was looking at that, I really had wanted to see multiple modules again explicitly called out.

It's not stated there. And then it would be nice to think about a cut-off frequency, that's a big thing.

CHAIRMAN BLEY: Let me ask you a question. Is this assuming the rulemaking goes forward?

Somewhere before it's over, when maybe these ideas have been fared out a little bit more, I think it would be useful if we could have another conversation and dig into some of the details of those

two papers and other things.

It's the same kind of picture we had elsewhere. It's nice boxes that say what you have to do but there's no hint of the work hidden inside those brief little boxes.

So we'd love to dig into that sum with you either before or at the end of this process, but I think now there's nothing to dig into.

DR. HOLAHAN: We can do that and the Steering Committee raised this issue as well and at the time, we didn't have any Applicants. So we didn't know but we always talked about needing further guidance for individual Applicants.

MEMBER CORRADINI: So if I might just ask, if you were to point to something for us to study, I would assume the ESP for Clinch River is the closest thing?

MR. COSTA: Well, Clinch River is under --

MEMBER CORRADINI: That's not for you, I was throwing the ball over to the fellow with the yellow shirt over there.

(Simultaneous Speaking.)

MEMBER KIRCHNER: -- again from the Clinch River early site permit.

MEMBER CORRADINI: That's the only thing

practically that I would assume there is a calculation by the Applicant and one can look at the details of.

MR. COSTA: Let me just clarify something, and I think you're aware of this but maybe for the public, for the Clinch River application, the discussion that will be this afternoon is under the current rule, under the current process that we have.

And what we're proposing today is something totally new for technology-inclusive so that will be different. So you're going to be looking at NUREG-0396 and the documents that Walter mentioned earlier.

So it's a different approach.

MR. THOMAS: Let me toss this back over to Dr. Compton and Mr. Segala.

MR. SEGALA: This is John Segala. I would just like to add, developing a source term for a design is essential for licensing so we're going to have to come up with a source term to do the design basis accidents as well as EP.

This is not solely an EP issue, this is something that you need and I think going into this gives the assumption that they'll be able to develop a source term for whatever particular design comes forward.

Maybe this is something that down the road we need to develop some sort of guidance to help these new technologies come up with what are all the steps they need to do to develop a source term. I'm not sure that's strictly an EP issue.

MEMBER CORRADINI: And just speaking for myself, I'm assuming they similarly are not but this is the first thing, this is one of the applications of it that make it quite important.

So we're looking for some sort of generalized guidance so, as Dennis said, you don't have a range of individuals that are highly sophisticated and maybe not as sophisticated and they don't appreciate the task ahead of them.

MR. SEGALA: I think that's probably why we encourage early pre-application engagements, so we can start talking to these developers and what are you doing to develop that, what kind of --

MEMBER REMPE: Some of the Meetings we've had on other topics related to this, some of the Staff had said, well, we've got some of these little reactors that just want to release the whole inventory and they have such a small amount it won't matter.

And yet, if you're doing this to qualify any sort of mitigating strategies, the chemistry, the

timing is important. And so I think those kind of questions also need to be thought about.

Is that really acceptable to say I'm going to just have the source term, just let the whole thing go, and I don't care about any sort of chronological or mechanistic type of considerations?

MR. SEGALA: I mean the NRC and maybe Steve can talk about it. We do consider maximum hypothetical accidents.

MEMBER REMPE: In an appropriate way?

MR. SEGALA: To take an approach that's very conservative and clearly conservative, and that is the approach that we have considered.

MEMBER REMPE: But in the past, sometimes what we think is conservative has turned out to not be conservative.

The TID source term was not perhaps the most conservative when we think about it later. So those kind of things need to be thought about perhaps.

MR. LYNCH: And just to briefly add onto that, this is Steve Lynch, I'm a Project Manager in the Office of Nuclear Reactor Regulation.

As John said, we do at times consider these maximum hypothetical accidents, whereas, some Applicants may choose to take credit for a complete

release of inventory. But that's not something we could accept in the Office.

It will depend on what are the consequences of that complete release? Where we have accepted that, it's been where Applicants have still demonstrated that even with that complete release, they're still meeting Part 1 for what's considered normal release at the site boundary so 100 millirem.

So that's an example of where maybe a complete release might be acceptable. For larger source terms, that's not something the Staff would necessarily accept. It would be considered on a case-by-case basis.

MEMBER CORRADINI: So let me ask you a historical question since Will brought it up, which I thought was interesting. 0396 has a technical basis in how they came to the ten miles.

Has there been any sort of analysis within the Agency since then that would re-look at that and come to a different technical basis or confirm that basis?

In other words, within Staff, has this been re-looked at computationally?

MR. THOMAS: Dr. Compton?

MEMBER CORRADINI: So let me take it as

somebody who is against it.

So if were against all of what we're talking about, I'd say 0396 is still acceptable and unless you show me a technical calculation that says that as I reduce the thermal power of the machine, 0396 becomes too conservative, I don't abide that.

Has there been any sort of analysis like that since 0396?

DR. COMPTON: There certainly had been calculations of -- I'm not speaking within the NRC -- but there have been calculations saying that if you have reduced source terms, if you can show you have reduced source terms, your dose distance curves are going to come in closer. And I think that's the principle.

I'll go back right now to a few things on source term. First off, clearly it's an assumption of the methodology that you have adequate information of source terms and also in frequencies if you're dealing with beyond design basis space.

That's just an assumption. What we did is we had looked at NUREG-0396 and did a critical review of the document and how they came up with it. And it's fairly clear that they did two lines of approach.

They looked at the existing safety

analysis reports, about 70 of them at the time, and then they did some scaling and they did some calculations to figure out where you would get doses exceeding 1 rem without really thinking of the frequency.

They just took the worst-case DBA LOCA. Then they also did another line of evidence which was more PRA-based, which is where they were looking beyond the siting, that single site source term. But then they considered the frequency of the accidents.

That's why as we're writing, as we're trying to come up with this methodology, we're trying to be very general and recognize the different designs. Different Applicants may want to use different strategies.

MEMBER CORRADINI: So, you actually were helpful. So, if tomorrow Joe's Reactor -- I didn't mean it the way it sounded. It came out wrong, I apologize.

But if tomorrow Joe's Reactor, LLC came to you and said we're new to the game but we think we've got the greatest machine since sliced bread but we need a methodology to start thinking source terms, would you point at the 0396?

Is that the only thing out there that you

point them to in terms of a methodology that they could exercise their thinking process with?

DR. COMPTON: For source term, no, and this is kind of a point, and back when 0396 was developed, they used existing information on source terms. They used the existing safety analysis reports, they used the PRA that they had which was WASH-1400.

And given that, one can look and see what is the effect of those source terms on a particular -- to get doses out, what effect would it have on an EPZ size? But those documents are not going to tell you how to do the source term.

For this methodology, that's an assumption that you can come up with this. Without trivializing, yes, that's a hard problem.

MEMBER KIRCHNER: Pragmatically, I'm thinking through a JM Applicant coming in. On paper I'm going to have a PRA.

We expect it's the Commission statements and policy that they expect these new designs to have enhanced safety and that can be manifested in a number of ways, lower frequencies.

But the question is that early in the game how uncertain are you about the PRA numbers that are

presented? Because if you're going to entertain frequency, then you're going to entertain that with a large degree of uncertainty early in the design.

And yet, you'll want an early site permit for one of these reactors. So, how do you swear the difference so to speak? I see that as very problematic for advanced designs that are not very mature, to enter into the frequency arguments.

Because they're probably going to say the CDF is 10 to the -7 or -8 so we don't have severe accidents. That was not the approach that was taken in 0396. They recognized that you could have a severe accident.

They didn't do it on a frequency basis, they just presumed that you could have a severe accident.

DR. COMPTON: They did presume that you could have a severe accident but then those were again weighted by the frequency, they had frequencies from the PRAs.

But, yes, they did not screen for that particular analysis, they didn't screen out any of the sequences.

MEMBER CORRADINI: They didn't screen out.

MR. COSTA: This is Arlon Costa.

Let me add a bigger picture because from 0396 we also recognized that the numbers that were picked out by the EPA PAGs, the 1 rem number, were the trigger point for all the other things that you have to do after an accident happens, and the accidents that you were talking about that Keith mentioned there.

So there's an advantage for emergency preparedness being in this situation because you're thinking about the big picture. But you can backtrack from it.

You still have to do the analysis that you were talking about but at least for the purposes of public protection, we use those same trigger points, the 1 rem number, where all these things have to be considered for the accident sequences to be evaluated from the licensee standpoint and bring that analysis to us.

And in the EP we're concerned about public protection and we feel that is a very safe number, not only because we have looked at it from 0396 but we're imposing or putting it in the rule now.

MEMBER KIRCHNER: I have no problems with the PAGs. I'm just curious as to how you're going to evaluate this.

It seems to me a very complicated undertaking to do a source term for a wide spectrum of accidents and then evaluate the quality of the PRA, which is where the frequencies are coming from and the main sequences, and then come up with -- would it not be more prudent for the Agency to just come up with a new definition based on just 0396, just scale with the source term?

CHAIRMAN BLEY: I'm going to interrupt at this point. You've got a sense that some Members have an area of concern and we would like to revisit it later. I'm going to correct a little bit.

When we were talking Clinch River, Arlon said that's under the current licensing. Yes, but it's an exemption, which they have to justify. And we'll be looking at that later.

MR. COSTA: And they are looking at the PAGs, the 1 rem number, for the boundary EPZ that they're looking for, properly so.

CHAIRMAN BLEY: I'm ahead. I'll wake him up and go ahead again.

MR. THOMAS: Well, it's not going by. When you started this conversation, it was on Slide 9, it was talking about 0396.

Well, you guys really jumped forward in

our presentation to Slide 10, not a whole lot but I was going to talk to -- Keith already did.

You guys have talked about what we were going to talk to about this slide.

Part of the rulemaking process was to engage research to get the subject-matter experts over there to do the analysis to look at for the Agency whether 0396, of course, could be applied to small modular reactors and other new technologies.

Because the premise there was it was written based on large light-water reactors that were operating in the '60s and '70s.

So, we engaged Dr. Compton over there to do the analysis for us. He quite eloquently talked about the analysis that he did. It's still ongoing, his analysis that we're doing is still ongoing.

So, Slide 11, please. This is where we're talking about the ingestion response planning.

Earlier and elsewhere in the documents, we clearly and decidedly said we're not including a predetermined zone for ingestion planning within this rule. And this slide tries to address why we, the Staff, feels this is an appropriate approach when doing so.

So the NRC is proposing ingestion response

planning requirements instead of a set distance as part of a performance-based framework.

The proposed rule would require licensees to comply with Section 50.160 to describe in their emergency plan the licensee's state, local, travel, or Federal resources for emergency response capabilities to protect against contaminated food and water from entering the ingestion pathway.

The concept of an ingestion pathway emergency planning zone was created in the 1970s when there may not have been a sufficient infrastructure to support the identification or removal of radiologically contaminated goods from the food chain.

Our primary concern in the 1970s were the livestock and food products that could be contaminated from a radiological release at a large light-water reactor.

Since the 1970s, there have been I guess improvements in the Federal and state capabilities to identify and remove from the food chain biologically and radiologically contaminated foods or produce. All of the response actions are long-term issues.

Some immediate precautionary actions could be taken prior to a significant release occurring. For example, state and local authorities could

instruct individual farmers to wash garden products and to place livestock in fields on stored feed.

State and Federal authorities frequently use similar precautionary actions to implement quarantines or embargoes for non- radiologically contaminated foods.

Further, Federal resources are available upon request to state, local, and travel response through any nuclear radiological incident, including no notice of incidents.

Federal resources that are available for radiological emergency response include the Federal Radiological Monitoring and Assessment Center, the advisory team for environmental food and health, as well as sampling and testing laboratories.

Through notable incidents documented by the Center for Disease Control and Prevention that demonstrate the capability to conduct large-scale quarantines for the multi-state outbreaks of E.Coli, infections from spinach in 2006, a multi-state outbreak of salmonella associated with eggs in July 2010, multi-state outbreak of fungal meningitis and other infections in October 2012.

In each case, the success quarantine and removal from public access of contaminated food and

water products in response to biological contamination demonstrates that a response to prevent ingestion of contaminated foods and water could be performed in an expeditious manner without a predetermined planning zone.

Unlike biological contamination, the cause is widespread illnesses and only discovered days after infection, a radioactive accident is a leading indicator that long-term actions to protect against ingestion should be considered.

Next slide, please. This slide addresses the existing offsite national level emergency preparedness. These programs are managed by FEMA, our Federal partner, who are in attendance today. I see several FEMA faces here.

They're waving at me; hi, guys. For all communities in the United States, the National Preparedness Goal allows for a scaled and coordinated response to any emergency.

The implementation and review of the frameworks considered effective practices and lessons learned from exercises and operations as well as pertinent new processes and technologies.

These technologies enable the nation to adapt efficiently to the evolving risk environments

and use data relating to a location, context, and interdependencies, allowing for effective integration across all missions using a standard spaced approach.

The mission areas on the slide represent a spectrum of activities that are highly interdependent and there is regular coordination among the Departments within FEMA and inter-agencies working to prevent, protect against, mitigate, respond to, and recover from all threats and hazards.

Next slide, please. On this slide, we briefly discuss the existing EP requirements for nuclear power plants, as I said briefly. The existing EP requirements for nuclear power plants and production utilization facilities are found in Part 50 of the regulations.

The regulations in Section 50.47 provide the EP requirements for nuclear power reactors including planning standards for onsite and offsite emergency response plans. These regulations took effect in 1980 after the Three Mile Island accident.

Appendix E identifies the specific items required to be included in the emergency plans. These regulations took effect in 1970 and were last updated in 2011.

Other relevant regulations include Section

50.33, the contents of the applications, Paragraph (g). So that's the 50.34, technical content of applications, Section 50.54, conditions of license paragraphs (q), (s), and (t).

CHAIRMAN BLEY: Kenneth, a quick question. Most of the guidance document is focused on, or a great bulk of it, on content of the emergency plans.

MR. THOMAS: Yes, sir.

CHAIRMAN BLEY: I haven't done the side-by-side comparison with 50.47 Appendix E but isn't most of the emergency plan the same as in the past or are there many changes?

MR. THOMAS: There's a considerable amount of changes from what we have in the current guidance, NUREG-0654, FEMA Rep. 1, that's a joint document, and the content and structure of Draft Regulatory Guide 1350.

Where NUREG-0654, FEMA Rep. 1 tried to identify capabilities or resources that should be available to implement the planning standards in 10 CFR 50.47, Paragraph B, if you look at the structure of the NUREG 0654, the planning standards A-16, JM whatever, must align with the 16 planning standards in Paragraphs 50.47(b) 1 through 16.

CHAIRMAN BLEY: Pardon me.

MR. THOMAS: So we looked at 50.47(b) and its alignment with NUREG-0654 and those were captured for the evaluation of emergency plans, and as stipulated in the NUREG-0800 standard review plan.

What we did here is we drafted Section 160 and we said, okay, let's line up a similar guide for Applicant who are going to come in for a permit application or a license application for the various parts, and they need to be able to submit in their application an emergency plan that describes what their emergency preparedness program is.

So there was a parallel that I used and that's why I kind of point to what we have here, 50.47, in this corresponding guidance, what we did in 5160 or what we proposed to do in 5160, and its proposed guidance as well.

And that's why we did that. We also wanted to make sure that we had some kind of generic or general guidance on how to develop a calculation or analysis --

AUTOMATED PHONE MESSAGE: Please pardon the interruption. Your conference contains less than three participants at this time. If you would like to continue, press star 1 now or the conference will be terminated.

CHAIRMAN BLEY: Apologies again. If you can capture the thread, keep going.

MR. THOMAS: Sorry for the interruption. So, we wanted to contain general guidance for it to assist the Applicant in submitting their application for this.

So, I'm trying to keep it technology inclusive. So that's why we had the preponderance of the guidance speaking to the content of our emergency plan, because that's our primary licensing document as you will hear later on this afternoon.

CHAIRMAN BLEY: You gave good guidance in a lot of detail.

MR. THOMAS: Thank you.

CHAIRMAN BLEY: We were looking for something similar on the other side. We're near the halfway point. I think one more slide and then it looks to me like that's a good place for our break.

MR. THOMAS: I think so as well. So here we go. I'm going to finish this one up. Next slide, please.

The summarized recent rule-making activities, as we mentioned earlier, with the regulatory basis, the draft was issued in April 2017.

We had a public Meeting May 10th, 2017,

where we facilitated the public's ability to construct public comments and submit those to us. We weren't accepting comments at that Meeting. I'll be very particular about how I say that.

As a result of the draft regulatory basis, we got 57 public comment submissions on the draft regulatory basis as we discussed earlier. NEI supplied one comment to us but questioned about how we were not addressing large light-water reactors and operating reactors.

They felt that given the information in draft reg, or at least how we interpret it, they felt that it may be technology-inclusive enough to apply to them.

Like I said before, the Staff initially considered that to be outside the scope and we didn't address that comment directly but upon concurrence of the proposed rule package that we have going now, we are reassessing that by including another opportunity for the public to weigh in on the scope of the FRN.

MEMBER REMPE: So I have a question about this document. The version I have says September 2017 but I guess that's the one that was issued November 2017.

But in there, and as well as in the draft

rule, you have a comment that says the NRC hasn't issued a license for a commercial non-LWR facility for construction or operations in Fort St. Vrain in 1973.

And maybe that's the way you guys refer to things but since the NRC wasn't established until after that, I'm kind of wondering if in the draft rule, if you correct it, you ought to fix that language?

MR. THOMAS: No, no, it's a valuable thing. We did catch a couple of our anachronisms, cell phones, riding horseback in the 11th century. I tried to avoid that at all costs.

So, we did catch a couple of those and we kind of face-palmed when we do that. So I appreciate it, I will take note of it and we'll address it in our published documents. We'll be happy to so I appreciate that.

Key messages, no comments were received that would alter the Staff's proposed approach in the draft regulatory basis. The Staff reviewed all of the comments, we binned them and then we addressed the meter on the final regulatory basis, or we deferred their resolution for the proposed rule and proposed guidance.

And then we also, as we were instructed by

the Commission, worked very closely with the decommissioning or the transitioning into decommissioning for nuclear power plant rulemaking that's currently in front of the Commission.

And we tried to apply those lessons learned as we went through. In fact, there were several Members on our Working Group that also were Members of that Work Group. There were several different themes. We addressed those as well.

The definition of small modular reactors, that's one of those action items that we included in the proposed rule.

Consequence-based approach for the sizing of the emergency planning zone and the need for a co-location discussion which is how we're addressing or using hazard analysis to talk about multi-module events and the co-location.

And the sum total is that we issued the final regulatory basis in the fall of 2017.

CHAIRMAN BLEY: Thank you. At this time, I think we'll recess until 20 after. We're going to start promptly at 20 after. See you back here then.

(Whereupon, the above-entitled matter went off the record at 10:01 a.m. and resumed at 10:19 a.m.)

CHAIRMAN BLEY: The Meeting will come to order. And Patricia, you're going to start?

DR. HOLAHAN: Yes. I'd like to just refocus us on this is an EP rule going forward. We'd like it to be published for public comment and the source term will be already addressed through the siting and licensing process.

And Bob may want to add something but we're focusing on the emergency preparedness aspects, not the source terms specifically.

MR. TAYLOR: I'm Robert Taylor, Branch Chief of NSIR. Very good interesting conversation that was just prior to the break.

We do want to emphasize that this is the emergency preparedness rule-making for small modular reactors and other new technologies and our guidance is based upon the information that would be available at the time the Applicant would be providing us with their emergency plan content based upon that guidance, which would include the EPZ size.

And we provided some guidance on how to make that determination on our EPZ size utilizing the methodology that had been researched on NUREG-0396.

So, during the licensing process, all the discussion we've had, those kind of items would be

assumed to have already been determined and policy decisions been made on it such that emergency preparedness would be utilizing that information, the Applicant would be utilizing that information in order to make that EPZ size determination, similar to what happened with NUREG-0396.

You're quite familiar, of course, that they had the WASH-1400 document to be able to draw from for the current fleet of operating plants.

Those kind of items would already be there for the designs that were being applied for by the Applicant, early site permits, already having that parameter set for EPZ sizes on what the source term would need to be.

It's divorced from that development, just that it would need to plug in that this is what it cannot exceed once those accidents are being determined.

So, the emergency preparedness is a general broad framework in order for small modular reactors and new technologies based upon assumptions that the licensing process, we would be part of that licensing process, utilizing that information that would already be available at the time.

So I just wanted to try to talk to the

emergency preparedness program is not where we have included in the scope a determination of how to create that source term.

That is something that would be part of another piece of the licensing process.

CHAIRMAN BLEY: Do I hear any protestations? You'll probably hear this from us again. Go ahead.

MR. TAYLOR: I'm just trying to delineate the scope of the rule-making itself.

CHAIRMAN BLEY: I understand.

DR. HOLAHAN: So, Kenny, we'll turn it back to you.

MR. THOMAS: Okay, welcome back.

Up to this moment, we talked about some of the policy and some of the considerations that the Work Group, the technical issues for the Work Group, are addressing within this rule.

On the next slide, Slide Number 15, we have a diagram that provides the overall structure of the rule and this relationship to the existing EP regulations.

We've already used the performance-based rule and the Applicant would need to specify in application which approach the licensee would use.

The options are the existing EP regulations or the performance-based regulations over in 10 CFR 50.160, or the proposed Section.

In the following slides I will present the specific changes to Sections 50.33, 34, 47, 54, and the new Section, 160.

For conforming changes elsewhere in the regulations are proposed to allow for an Applicant or a licensee to use either of the existing EP regulations or the new set of regulations in Section 160.

I'll draw your attention now to the bottom or lower right-hand corner of the slide. The Applicant would have to provide an analysis to support the specific EPZ size.

If the Applicant demonstrates that a side boundary EPZ is appropriate, then the regulations in Paragraph (c1)IV(b) would not apply to the licensee.

If the emergency plan would extend beyond the site boundary, then the Applicant would need to address the requirements in C(1)IV(a) and (b) of the proposed rule.

The Staff would then need to re-engage our friends over at FEMA for a review of the offsite plan submitted as part of the licensed application or

permit application as appropriate.

There is guidance in the Draft Regulatory Guide to support the implementation of the performance-based regulations.

Next slide, please.

In Section 50.2, the Staff is proposing adding three definitions, one for a non-light-water reactor means that nuclear power reactor using a coolant other than light water, non-power production or utilization facility means a non-power reactor testing facility or other production or utilization facility licensed under Section 50.21(a), Section 50.21(c), or Section 50.22 that is not a nuclear power reactor fuel reprocessing plant.

This definition aligns with the non-power production or utilization rule. Small modular reactor means a power reactor as defined in 10 CFR 100.3 licensed to produce heat energy up to 1000 megawatts thermal, which may be a modular design as defined in 10 CFR 52.1.

In the rule, we used the explicit language for the facilities, although for convenience, while I'm speaking I will continue to use other than new technologies, having Dr. Skillman's comment from earlier about the use of ONT in the ruling guidance as

well. I made a note of that.

In Section 50.33, this proposed rule would revise Paragraph (g) to construct two sub-paragraphs, (g)(1)and (g)(2), which would allow for the Applicant to select which EP regulations the licensee would meet.

Additionally, paragraph (g)(2) would establish an EPZ size determination process for small modular reactors and other new technology for Applicants to comply with Section 50.160. We will discuss this further in a few minutes.

In Section 50.34 of this proposed rule, we would revise paragraphs(a)(10) and (b)(6)IV to require small modular reactors and other new technologies described in their preliminary safety analysis report or final safety analysis report as appropriate to the application and the plans for coping with emergency based on the requirements in either Section 5160 or Appendix E to Part 50.

Next slide, please. Section 50.47, this proposed rule would remove and reserve Paragraph (C)(2). Paragraph (f) denoting the offsite remaining response plan requirements in Section 50.47(b) do not apply when the EPZ is entirely within or at the site boundary.

This aligns with the proposed changes to the transition to the decommissioning rule that's before the Commission.

In Section 50.54, this proposed rule would add a new subparagraph (Q)(7) but would contain the details for submitting license amendment requests for small modular reactors and other new technology licensees implementing the associated plan changes necessary to meet the requirements in Section 50.160.

The Staff proposes revising Paragraph (s)(3) to add clarification that if the standards apply to offsite emergency response plans or with the planning activities in the new Section 5160(c)(1)IV(b) apply, then the NRC will base its reasonable assurance findings on a review of FEMA's findings and determinations.

This proposed rule would also revise the paragraphs in these Sections to include conforming changes for a small modular reactor and other new technology for Applicants to use the Section 50.160 as applicable.

Next slide, please. The following slides provide the details of the Staff's proposed rule. This proposed rule would add Section 5160, which would contain the alternative EP requirements for small

modular reactors, non-light-water reactors and non-power-production or utilization facilities.

Paragraph (a) is the applicability. Summarizing that paragraph, Applicants or licensees that elect to use Section 51.60 must comply with the requirements of this Section for the contents of their emergency plans.

(B) is the definition. We have one new definition here, although, you've seen it elsewhere in 10 CFR 20.1003 for a site boundary.

MEMBER KIRCHNER: Could you just clarify, does that equal the exclusion area boundary?

MR. COSTA: No, it does not.

MEMBER KIRCHNER: So the site boundary is...what's the distinction?

MR. COSTA: Basically, the site boundary is what is owned by the licensee and the exclusion area is a calculation using the source terms.

MEMBER KIRCHNER: They may be or may not be the same?

MR. COSTA: They may or may not be the same.

MEMBER KIRCHNER: Okay.

MR. THOMAS: Next slide, please. Paragraph (c) are the requirements. The emergency

planning shall contain the information needed to demonstrate compliance with the elements set forth in this paragraph.

The NRC will not issue an initial operating license to a licensee unless a finding is made by the NRC that there is reasonable assurance that adequate protective measures can an will be taken in the event of a radiological emergency.

No finding under this Section is necessary for an assurance of a renewed power reactor operating license.

Paragraph 1 is the performance-based framework. The licensee must demonstrate effective response in drills and exercise for emergency and accident conditions.

The Draft Regulatory Guide 1350 simply states Section 50.60 requires licensees to demonstrate effective response in drills and exercises for emergency and accident conditions.

I, maintenance and performance, the licensing must maintain in effect preparedness to respond to emergency and accident conditions and describe in an emergency plan the provisions to re-employ to maintain preparedness.

Essentially, the Applicant needs to

describe the process of running drills and exercises, critiquing its performance, implementing corrective actions to improve its performance, and develop the metrics to measure their effectiveness in maintaining their preparedness.

The guidance for the emergency plan is it should contain a general description of the facility, any site-specific definitions, any relevant appendices, drawings, diagrams, and other information needed to demonstrate compliance with this Section.

The emergency plan should describe the process for maintaining and making changes to the emergency plan and associated procedures, including methods to account for facility changes and methods used to conduct independent reviews of the EP program.

Next slide, please.

MEMBER SKILLMAN: Question, please?

MR. THOMAS: Yes, sir?

MEMBER SKILLMAN: This is a topic that has been debated very thoroughly around this table after Fukushima and it has to do with changes that get made off site.

So here we have the site, nice, tight site, the site demonstrates by and large that its emergency planning conditions and its releases are

fairly well described by the site boundary and we end up with an emergency plan that the relevant authorities and the licensee agree to.

And then there are major changes in the area whereby the emergency plan probably needs to be adjusted. How is that potential change factored into the new 50.160?

MR. THOMAS: That's a great question. Could you go to Slide 28, please?

MEMBER SKILLMAN: I'm looking for the word contemplated or actual changes wrapped in that paragraph.

MR. THOMAS: They're not in that paragraph.

(Simultaneous Speaking.)

MEMBER SKILLMAN: -- the question, okay.

MR. THOMAS: So the words that you were looking for again?

MEMBER SKILLMAN: Actual or contemplated changes. So, everybody is happy to put a hospital right on the property line, everybody's happy to put a large school right on the property line.

I know it's nuts but the issue that we dealt with in months following Fukushima as we sat around the table is how can we handle the changes in

the locality that affect how we see the licensed acceptability of this?

MR. THOMAS: Well, the 5054(2) just kind of mentions it's part of the change process but if it's not being proposed by the licensee, it's not necessarily going to be analyzed.

One of the interesting parallels between what you just said is similar to the resources working with IAEA small modular reactors regulators was that Great Britain has different zoning laws, which they are able to immediately tackle this as part of their nuclear reactor safety regulations.

They talk about how the licensee and the community action monitors to maintain a low population zone for their facility. So what I can do is go back and take a look at that. I made a note of your comment and I can go back and look at that.

But quite clearly, those words are not in this but this regulation is intended to be continually assessed. It's not just once that you do for siting and then not going on.

The licensee should be aware of, hey, there's a new transportation hub or a new industrial facility that's going to be put into place near here. They need to go back and re-evaluate the hazard

analysis.

MEMBER SKILLMAN: If the words continually assessed were to be endowed, I think it is accurate to communicate that what we've come up against was the motion of finality, which we all understand very clearly.

Once the permit's been granted, it's fine, and so that raises the question, what happens when there's a change? How final is final? Does something need to be reassessed?

Hence the words that you just used. Since this is new rule-making, those words might just be the right thing at the right time as we looked at ONTs and as we looked at Carpin SMR and Ravenswood across the East River from the United Nations, a site that was once considered in 1964.

I'm just saying.

MR. THOMAS: That's a good point. We are going to take a note of it, sir.

MEMBER SKILLMAN: Thank you.

MR. TAYLOR: This is Bob Taylor, Branch Chief of NSIR DPR. Your question was very well taken. It does go back to the 54(q) regulation that talks to having a plan in place and the furtherance of 54(q), it talks to maintain the effectiveness of the plan.

I think this is a possibility to try to clarify what that continuous observation is of all the factors that would impact the plan, be it on site or off site, even if you have a site boundary EPZ, that you would need to have that in consideration at all times. And the licensee needs to be made aware of that.

But that is the intent of that statement about maintaining the effectiveness of the plan, it's not just if you make a change to the plan. You have to make sure that the change maintains effectiveness of the plan with the change.

It also means outside influences if the plan as written doesn't get changed, what does that do to the effectiveness of the plan? So instead of a change, it needs to be initiated from that offsite impact.

MEMBER SKILLMAN: I think what's missing, at least from my perspective, is the trigger statement. Something that communicates and, oh, by the way, you can't just let this sit for 10 or 20 or 30 years.

There needs to be a trigger at some point in time, when you go back and you take an official look, and you formally document what we assumed before

remains sound today for there have been some changes and we're going to assess those changes and we're going to give a report in 90 days or whatever it is, and then if we need to make adjustments, particularly to our emergency plan, we will.

CHAIRMAN BLEY: I'm going to back up what Dick is saying a little bit.

We've run into, in this room, both from Staff and from holders of licenses completely divergent arguments on this issue from here's the quarter part of the regulation, when you need to do this, to nobody does it, we don't do it, to Applicants and licensees who say, yes, we do that all the time.

It's not consistent throughout the Staff and throughout our regulated people. It would be nice to make it clearer.

(Simultaneous Speaking.)

MR. TAYLOR: -- Committee Members is this is in opportunity to possibly take a look at that.

MEMBER SKILLMAN: You're proposing new regulations. This is the time to catch it is my point. Thank you.

MR. THOMAS: Thank you, Dr. Skillman. Return us, please, I think back to Slide 20. Did I skip number 19? Good, that's what I thought.

Performance indicators, the process used to develop performance indicators for each emergency response function in (c)(1)III, including the methodology used to develop the indicators, the basis for relying on the indicators, and how acceptability or successful achievement is determined.

In the guidance the Staff provided for an example for the methodology to develop the premise indicators is a quotient, a percentage quotient, number of correct opportunities over the number of total opportunities.

Next slide, please. Further, parts of the performance-based framework and the things that we're expecting the Applicant and licensees to be able to demonstrate. I'm not going to read each and every one of these to you. It could get kind of boring.

So here we go. At the top of the list we have vent classification and mitigation, assess, classify, monitor, and repair facility malfunctions in accordance with the emergency plan and return the facility to safe conditions.

Part of this is not getting into the ops or maintenance or engineering procedures, it is in accordance with the emergency plan for staffing, making sure you have the right individuals identified

to be able to perform these.

And then using those individuals to actually perform, it's not getting into the ops, maintenance or any of those other procedures.

Protective actions, plants should maintain protective actions for onsite personnel for emergency conditions, recommend protective action to offsite authorities as conditions warrant.

Communications, establish and maintain effective communications with the emergency response organization and make notifications to response personnel and organizations who may have responsibilities for responding during emergencies.

Command and control, establish and maintain effective command and control for emergencies by using the supporting organizational structure with defined roles, responsibilities, and authorities for directing and performing emergency response functions as described in Paragraph (c) of the Section.

So particularly for the command and control, when we took a look back at the near-term taskforce, command and control was one of those concerns from Fukushima Daiichi.

Among the other ones that we have on here are staffing and operations, radiological assessment,

radiological conditions underneath that, protective equipment for radiological assessment, core and vessel damage and releases for radiological conditions.

We also have one for re-entry and one for critique and corrective actions.

Yes, sir?

CHAIRMAN BLEY: I'm going back to where I started. The last time you asked the question you pointed to I think some guidance that's occurred over the years and other documents that have led to the things you're incorporating in 160 but are not, I think he said, in Appendix E.

Now, most of these things are in Appendix E in one form or another. I hate to ask it this way, the way you're writing 160, is that the way one might think Appendix E ought to be revised?

I'm not suggesting you ought to run off and revise Appendix E right now but the impression I got from what you said earlier is these are things that have been adapted into the guidance for meeting Appendix E that will now be part of 160.

Am I misinterpreting?

MR. THOMAS: No, sir, I don't think you're misinterpreting it, and by the way, Bob, I need more money for my project.

MR. TAYLOR: No problem, Kenny, it's on its way.

MR. THOMAS: Okay, so the ACRS says that -- Dr. Bley, I think the approach that we took was emergency management is emergency management so there should be a great number of parallels between what you see in any emergency response framework.

CHAIRMAN BLEY: I would think so.

MR. THOMAS: Exactly.

So the similarities between what we see in Section 5160 may be very similar to what you see in Appendix D and 50.47 but then also very familiar with what our friends over at FEMA put out for the national planning frameworks.

Emergency management and this is emergency preparedness as a portion of emergency management. There's no crystal ball on this. What we did do is construct Section 5160 in what I would say the importance, and again, the emergency classifications mitigations at the top of the list.

That's where we get started for our licensee or an Applicant. Corrective actions, we have to protect our individuals.

When we first started looking at this, we looked at the significant determination process and in

our document we have risk-significant planning standards, the four that we currently have under 50.47.

I said, well, I'm going to move those to the top of my list because those are the ones that are the most important to us currently and what's really important for everybody else.

So good emergency management is good emergency management. There are parallels, I'm glad you're not asking me to go out and revise Appendix E, I think that would be fraught with a lot of other things that I don't really want to address.

This is an opportunity for us to write the new rules to take another look at what's really applicable to small module reactors and other new technologies and that's where we constructed this framework the way we did.

CHAIRMAN BLEY: So let me ask a little differently because I don't see the difference between the LWR here and the SMR for this kind of thing.

If we didn't have an Appendix E in 50.47 and we were going to write one tomorrow, I'm thinking we'd write it kind of the way you're trying to write 160. That's Working Group.

Do you agree?

MR. TAYLOR: If I can? Again, Bob Taylor.

CHAIRMAN BLEY: I'm not suggesting we do that, I'm trying to understand why there would be a difference in principle.

MR. TAYLOR: What we found is, and I'll have to congratulate the authors of Appendix Echo at this time because they incorporated into Appendix Echo all the core principles of emergency preparedness.

They also did that in 10 CFR 50.47 Bravo and those stand today and it has been validated by the fact that our partners at FEMA have established core capabilities.

And whenever we start to align those core capabilities in the current national response framework that's currently existing in Appendix Echo, 5047 Bravo, they are matched well such that all of those core capabilities of today are found within Appendix Echo and as a result, also in 160.

So we're following suit with what's happened not only in the past but what's the current principles of good emergency management.

So, when you're asking would we rewrite Appendix Echo to mimic 160, I would say we would be rewriting Appendix Echo to match what the current level of emergency management principles are today,

which is already found in the Appendix Echo in 160.

So, yes, that would be something that would follow the logic principle.

CHAIRMAN BLEY: So let me try one last time. Is there any technical reason why there should be a difference between emergency planning other than the size of the EPZ perhaps for the SMRs and for the OWRs?

MR. TAYLOR: To answer that question, we would have to take a deep dive into the Appendix Echo and we did not do that in the scope of this rule-making.

I'll be honest about that in that that has been brought up, the Working Group has approached that but what we're saying is that's one of the reasons for the questions, because if that were true, we would want to give that assessment and an analysis as part of the rule-making which we haven't done.

MR. COSTA: Dr. Bley, just to emphasize the direction that we're going in the rule, in a little bit Kenny is probably going to talk a little bit more about the boundaries.

You're going to see that for the offsite boundary, the whole Appendix Echo is part of that. And when you're talking about the boundary, the inside

boundaries, we take advantage of the performance-based approach that we have.

And you're going to see that some of the requirements in Appendix X was brought in and some are not necessary because of the size of the boundary does not apply.

CHAIRMAN BLEY: Here's where I'm coming from with everything I read in the rule and in the guidance. It's all about how to do emergency planning. I think that subsequently changed.

The real change is it might have a different-sized set of boundaries and part of which is that source term which allows you to do that.

So all of our focus is on the stuff that isn't really changing much and we'll send somebody else to be covering this other piece. And I don't want to keep going on that.

MR. THOMAS: Let me (Simultaneous Speaking.) Patricia Milligan.

DR. MILLIGAN: Hi, Patricia Milligan, Senior Advisor of Preparedness and Response.

To get to your question, 160 is describing a performance-based program which is going to be very different than 5047 and Appendix E which describes a more deterministic approach that would have to EP.

So in order to keep them separate, the criteria 160 is describing performance-based. So that's why we're trying to do it a little bit differently and call them out separately.

MEMBER CORRADINI: I think all Dennis is asking is once ten miles becomes X miles, once that's done, the procedure ought to be technically similar if not identical. I think that's all you're asking.

CHAIRMAN BLEY: It is but she brings up the point of what the performance criteria would be, which is different.

DR. MILLIGAN: Which is different, yes, and will look different. So I think that's an important distinction and Kenny will probably talk a little bit more about that when he gets the opportunity to talk more about the performance-based program.

MR. THOMAS: Let me give a behind-the-curtain look. When the Work Group started this process we started with the end in mind.

So one of our retirees, he's now since retired, Steve Levine, who you are probably very familiar with, he said no rule is good if you can't write a contrary to statement.

So they illustrate the difference between

what would be contained in 50.47 or Appendix E in today's rule and what we're proposing in Section 150 is the contrary to statement.

Contrary to statement for the current regulations would be contrary to the regulation 50.47(b) where the licensee failed to maintain the capability to perform whatever.

Here in Section 160, the contrary to statement would be contrary to the requirements of the 5160(c)(1)III whatever, the licensee failed to perform whatever.

(Whereupon, the above-entitled matter went off the record at 10:51 a.m.)

CHAIRMAN BLEY: Thanks. That's good. I think you can go ahead.

MR. THOMAS: I think I'm on slide 22 at this point.

MEMBER SKILLMAN: Kenneth, let me as you a question.

MR. THOMAS: Yes.

MEMBER SKILLMAN: Back on the slide you just presented, you identify a event classification and mitigation.

MR. THOMAS: Yes, sir.

MEMBER SKILLMAN: I look at Draft Guide

1350, pages 9 and 10, and you provided some sample EAL descriptions.

MR. THOMAS: Yes, sir.

MEMBER SKILLMAN: I'm stuck on the EALs because I've lived a rich life being judged on how well we executed EALs.

MR. THOMAS: Yes, sir.

MEMBER SKILLMAN: The ones that are presented in Draft Guide 1350, I will read them: abnormal radiological controls, external hazard and natural phenomenon, system malfunction, fission product barriers and judgment.

I will caution be certain that the EALs are based on source term and radiological consequence as opposed to administrative issues. For instance, at one site we got to a site area emergency because of a perceived intruder into a vital area. A security issues.

I'm not saying for a millisecond that security is not important but I'm not sure we ought to get to a site area emergency in this procedure in Draft Guide 1350. I think this ought to be a radiological influence instead of guidance for the industry.

If there are other reasons to escalate an

EAL, and security may certainly be one, it ought to be somewhere else. Otherwise, I think it in tolerates what you're trying to communicate here, or it somehow affects the importance of the source-term arguments that you are attempting to make in this Draft Guide.

I hope I haven't goofed up in my communication. What I'm trying to say is there may be a reason to get to a site based on security.

MR. THOMAS: Yes, sir.

MEMBER SKILLMAN: No doubt very important. Highly important. I think what you're trying to drive at here is with an SMR and an ONT you can have the source term that is so very very low you may be able to bring in your boundary. That has some very important implementation as to where we might be able to park an SMR. Security ought to be just as important but it not ought to be hiding in these EALs that are basically radiologically based.

MR. THOMAS: Yes, sir.

MEMBER SKILLMAN: Thank you.

MR. THOMAS: Point taken. Slide 22. These are the planning activities. These planning activities are for those activities that may be impractical or even if you did measure them, those measurements may not mean that much. These planning

activities are for all SMRs and ONTs, not just ones that are situated for onsite and offsite.

(iv) Planning activities. The licensees must be capable of -- this is where we have the capabilities -- preparing and issuing public information during emergencies.

Were you able to coordinate with the public information with federal, state, local, or tribal officials to make sure that if you have declared emergency and the sirens and the fire trucks or whatever, are you able to adequately notify the public what's going on.

Implementing the NRC-approved emergency response plan in conjunction with the licensee safeguard contingency plan. Can you implement both at the same time.

Next slide, please. Onsite for voice communications with the NRC. There's no surprises there. When you have an emergency we want you to be able to notify us and do you have the capabilities to be able to do so.

Establish an emergency response facility from which effective direction can be given and effective control can be exercised during an emergency with capabilities to support emergency response

functions described in Paragraph C. In the emergency plan it should describe the facilities; location, capability, size, equipment, backup locations if it's needed.

MR. COSTA: Dr. Bley, in this slide here -- this is Arlon Costa again -- where the incorporation of Appendix E is coming into this rule for the performance base, part of it, as Kenny has demonstrated here about voice communication, about emergency facility. You are going to see a slew of things like that from the experience as a baseline.

CHAIRMAN BLEY: I can find everything over here.

MR. COSTA: Okay.

CHAIRMAN BLEY: In fact, I can't find anything here, and if you have one as we go through that wouldn't apply to an LWR, say this one really doesn't apply to an LWR. But go ahead.

MR. THOMAS: Challenge accepted. The four next slides describe the planning activities for those facilities that have an EPZ that extends beyond the site boundary. These are the offsite planning.

Contacts and arrangements made and documented with local, state, tribal, and federal government agencies as applicable with

responsibilities for coping with the emergencies including identification of the principal coordinating agencies and coordinated reviews of changes in offsite and onsite planning and preparation that may touch tangentially to the other question about changes to the offsite areas. This would be applicable to those facilities that do have an offsite plan.

Offsite organizations responsible for coping with emergencies and means of notifying in the event of emergency, persons assigned to the emergency organizations including the means of validating the notifications and the time period by which the notifications must be completed, and primary and secondary methods of communicating the notification.

This is going back to our means of notification, validation of the notification, time within which the notifications need to be completed and, of course, primary and secondary methods of making those notifications.

Next slide, please. Protective measures to be taken within the Emergency Planning Zone to protect the health and safety of the public in the event of an emergency including the procedures by which the protective measures are implemented, maintained, and discontinued.

There's a subtle difference here about where it's discontinued. We don't currently require that for large light-water reactors. Have a description of where the protective measures could be discontinued. Subtle difference.

No. 4. Site familiarization training for any offsite organization that may respond to the site given an emergency. We currently do that for large light-water reactors. In the guidance in 1350 the service-specific information concerning a site's capability should be shared with the responding service.

For example, the locations of important fire mains, hydrants, suppression systems should be provided to the fire response services if needed to respond to the facility to assist in fire suppression investigation. Likewise, for local law enforcement and medical services, services should be aware the capabilities of the site and the locations of key resources.

CHAIRMAN BLEY: I'm just curious since you pointed that one out --

MR. THOMAS: Yes, sir.

CHAIRMAN BLEY: -- even thought it's not spelled out currently, if we reach the point that all

the stuff was gone, what happens if the staff recommends to the Commission that we no longer need emergency planning, how is it done? It's not spelled out in the rule.

MR. THOMAS: You're talking about termination of the event?

CHAIRMAN BLEY: No. This was for an event here. I thought you meant --

MR. THOMAS: This is the capability to be able to respond to an event.

CHAIRMAN BLEY: Yeah. And it's spelled out when we no longer have to be able to do that. I'm sorry. Go ahead. I'm slowing us down.

MR. THOMAS: That's all right.

An evacuation time estimate. The areas beyond the site boundary but within the Emergency Planning Zone.

Next slide, please. Offsite licensee and any backup facilities from which the licensee coordinates the licensee's response with the offsite response. Kind of like the ELF ISH thing.

No. 7. The means of making offsite dose projections and the means of communicating the offsite dose projections to the offsite response coordinating agencies.

No. 8. The means by which public information is provided to the members of the public concerns emergency planning information, public alert notification system, and any prompt actions that need to be taken by the public.

Here is where I would like to -- we had another face palm, Dr. Rempe, where we had a small discrepancy in the Draft Regulatory Guide where we had guidance to implement an emergency response data system that is required by 10 CFR 50.72(a)(4). There is no requirement in Section 164 for emergency response data system.

MEMBER SKILLMAN: Why not?

MR. THOMAS: Because the requirement for emergency response data system is actually located in 50.72(a)(4) for nuclear power reactors. If you are a nuclear power reactor irrespective of where your EPZ is, we're not changing this rule and you still have to implement emergency response data system. I just need to have a similar rule in EP to implement that rule. It's already in there.

MEMBER SKILLMAN: Okay. Thank you. So it's not precluded, it's just, if you will, embedded in another part applicable regulation.

MR. THOMAS: It is. In Appendix E we have

Section 6 something is the emergency response data system where we address that, but the requirement is actually in 50.72 so I didn't see the need for redundancy.

MEMBER SKILLMAN: Okay. Thank you.

MR. THOMAS: We should be on Slide 27 where we start talking about reentry, the general plans and methods to allow entry into the Emergency Planning Zone during and after an emergency.

Capabilities should exist that the specific plans can be developed during an emergency to allow for timely reentry into the affected parts of the EPZ and the facility as conditions warrant.

No. 10. Drill and exercise program that tests and implements major portions for the planning and preparation of coordinated response by the onsite response organizations with the offsite response organizations within the Emergency Planning Zone without a mandatory public participation.

No. 11. The methods for maintaining the emergency plan, contacts and arrangements, procedures, evacuation time estimate up to date including periodic reviews by the licensee and the coordinating organizations.

And the next slide, Slide 28. We get to

the hazard analysis which we looked at earlier. The words "collocation, modularity, industrial" I don't believe are in the actual rule text. I used that on this slide just to pinpoint what I'm actually addressing, or intend to address, with this proposed paragraph.

MEMBER CORRADINI: I don't -- so you're saying -- I'm not sure what you just said. You're saying that what's in the parens doesn't appear in the rule?

MR. THOMAS: I don't believe it does.

MEMBER CORRADINI: But your intent is to consider it?

MR. THOMAS: Yes. This is the consideration that we have for the hazard analysis for the intensive -- elsewhere I told you I was going to address collocation, modularity, and industrial in the SRMs and the SECYs. This is where I'm addressing collocation, modularity, and industrial facilities.

CHAIRMAN BLEY: Why had you folks decided not to be specific on that?

MR. THOMAS: Is it in the rule language? I didn't think it was. It is in the guidance.

CHAIRMAN BLEY: Okay.

MR. THOMAS: I was getting ready to read

the guidance --

CHAIRMAN BLEY: I remembered it from somewhere.

MR. THOMAS: Yes, sir. It's in the Statements of Considerations.

CHAIRMAN BLEY: Legally binding.

MR. THOMAS: Modular reactor, non-light water reactor, or nonpower production or utilization facility. Applicant or licensee that chooses to adopt the EP regulations in Section 5160 must include in the emergency plan an analysis of any credible hazard from a contiguous facility that would adversely impact the implementation of the emergency plans.

The emergency plans should describe the results of the hazard analysis of any contiguous facility, planning activities, or emergency response functions that will address any credible hazard that would adversely impact the implementation of the emergency plans.

The analysis should identify and characterize site-specific hazards posed by multi-modular or nuclear units or contiguous facilities that could complicate the small modular reactor or non-light water reactor or nonpower production and utilization facilities' emergency

response. For example, the nature of the challenge in terms of timing, severity, and persistence.

Evaluate the impacts of the identified hazards; for example, realistic response time, functional threats caused by the hazard, strategies needed to address the hazard. And describe the planning activities or emergency response functions that will mitigate the impacts of the identified hazard.

MEMBER SKILLMAN: And this is where we would sure like to see something like what we periodically updated.

CHAIRMAN BLEY: Just for my illumination the Statements of Consideration, are they in the FRN?

MR. THOMAS: Yes, sir.

CHAIRMAN BLEY: Are they labeled that way? I didn't remember seeing that label.

MR. THOMAS: I don't think it's labeled that way.

CHAIRMAN BLEY: That seems to be happening these days which is a little confusing because my understanding is Statements of Consideration are legally used and the lawyers refer back to them all the time. Except in some of the older rules it's really hard to find the Statements of Consideration.

If they are in the FRN, that's great. It would be nice if we knew what they were.

MR. THOMAS: And Howard Benowitz, our attorney, is at the mic.

MR. BENOWITZ: Howard Benowitz, Office of General Counsel. The Statements of Consideration are the part of the Federal Register Notice that appear for the rule text.

CHAIRMAN BLEY: Always.

MR. BENOWITZ: I think the Office of the Register refers to them as supplementary information. I think that is the actual heading in the FRN. They are not legally binding. The Statements of Consideration, supplementary information, are more like guidance so lawyers might be referring to them not to legally binding requirements, but maybe for explanations of those requirements. That's their intent.

CHAIRMAN BLEY: What the requirements mean.

MR. BENOWITZ: It's what does the agency mean in the rule language. What is the basis for the proposed rule.

CHAIRMAN BLEY: They used to actually be labeled Statements of Consideration.

MR. BENOWITZ: Long time ago.

CHAIRMAN BLEY: Some of us have been around. Go ahead.

MR. THOMAS: Okay. Slide No. 29. We lumped two of these requirements on the same page. One of the Emergency Planning Zone. Licensees and applicants must determine and describe the boundary, physical characteristics of the Emergency Planning Zone in the emergency plan.

This is not the analysis. Remember the analysis is required as part of the application and those requirements contained in Sections 50.33 and 34. This is just -- once you establish the EPZ what does it look like. Currently we have maps and other descriptions and stuff like that in the emergency plan. It's the same idea here.

The next one is the ingestion response planning. This is the requirement for the description of all of the resources and capabilities that would go into ingestion response planning. This is applicable for those facilities with an onsite only EPZ within the site boundary or at the site boundary, and for those facilities that have an offsite EPZ.

Next slide, please. Implementation. Here we are not deviating from what's already required for

operational programs. Eighteen months prior to fuel loading for Part 52 combined license application, or 18 months before the issuance of an operating license for a Part 50 operating license issuance. We're not deviating too far outside that box for the implementation of this operational program.

Next slide, please. We've been talking all day about a particular question that we have set up for this scope. Here are all of the specific requests for comments and it's contained within Section IV of the FRN and there are several other sections.

There are specific questions on here. We are asking a question about the scope of the proposed rule, performance-based requirements, drills or exercises, planning activities, hazard analysis for contiguous facilities, the Emergency Planning Zones.

Next slide, please. They are up on the screen. There's all sorts of more questions here. Draft regulatory analysis question, cumulative effects of regulation, plain writing, environmental assessment, Paperwork Reduction Act, and on the Draft Regulatory Guide. Within the FRN we actually have the addresses and instructions on how the public can provide us those comments as required.

Next slide, please. Slide No. 33. There is a nexus between what we're doing here and the Licensing Modernization Project. The Licensing Modernization Project's objective is to develop technology-inclusive risk informed and performance based regulatory guidance for licensing with non-light water reactors.

The NRC could consider and possibly endorse an industry-submitted working draft of a consolidated guidance document called Risk-Informed Performance-Based Guidance for Non-light Water Reactor Licensing Basis Development.

The NRC is supporting activities related to the licensing modernization project being led by Southern Company coordinated by the Nuclear Energy Institute, and cost sharing by the Department of Energy.

The current draft of this document was submitted on May 27, 2018. The staff has held several public meetings to discuss the draft guidance document and brief the ACRS in June of 2018. As you can see from the purpose of the licensing modernization project the staff is currently working to ensure the guidance related to the project is consistent with and supportive of the proposed rule and draft guide.

The staff is scheduled to brief the ACRS Future Plant Design Subcommittee again in October 2018 and the ACRS full committee in December 2018. The staff is targeting late calendar year 2019 to issue a draft regulatory guide DG-1353 to endorse the NEI-18-04 guidance which will be submitted to the NRC.

MEMBER REMPE: When we had the meeting on this, we discussed the point that the two-hour limit for 10 CFR 20 was not included. They said, well, they need them for a licensing basis event selection.

That's all true, but as I recall, former Commissioner Apostolakis pointed out, "Yeah, you're right. Even if you use this to select your licensing basis events and you design your reactor that way, you may not meet all the regulations."

Now, with emergency planning it seems like it better include that two-hour limit for 10 CFR 20. It's just something to think about if you do this draft guide and you endorse it.

MEMBER CORRADINI: I don't understand. Versus the --

MEMBER REMPE: Okay.

MEMBER CORRADINI: For them to make an action based on the PAGs is a dose over time and the time goes longer. That's why I'm not clear. You guys

are writing it down so I'm still not sure if there's a consistency.

MEMBER REMPE: I'm not sure at all but I just am bringing up the point that if you endorse it, it may not meet all the regulations. Yeah, you can use it for licensing basis events. For the PAG, again, it's not clear to me and it would be cleaner if they would include all of the regulations in that document in the draft guide.

MR. SEGALA: This is John Segala, NRC staff in NRO. I think it's part of the licensing modernization project. We are making it clear that, you know, if we endorse that process, they still have to meet all the NRC's regulations.

MEMBER REMPE: If you design a plant for that, it may not need all the regulations. Thanks.

MR. THOMAS: Okay. That concludes my portion of the presentation. I'm going to now turn it over to Dr. Carrera who will discuss the status and the path forward.

DR. CARRERA: Okay. Thank you, Kenny.

Good morning, Mr. Chairman, and ACRS members, and members of the audience. My name is Andrew Carrera. I'm one of the project managers for this rule. Dennis Andrukat is my co-pilot and he's

standing back there. You can look up his number if you have any questions.

(Laughter.)

Thank you again for allowing us the opportunity to come in front of you to discuss this rulemaking on Emergency Preparedness for Small Modular Reactors and Other New Technologies.

I initially made this protest to Trish before and I'm making this protest to you, Mr. Chairman. After two years of hard work, scraping my knees and my hands, catering to every need of the working group, all I get is just one lousy slide that talks about schedules and process which no one wants to hear. I've got to follow through and be a soldier about it.

(Laughter.)

I would like to take a moment today to briefly go over the current status of the rulemaking effort on where we are now and where we're going next.

You've heard from Trish and Kenny on how we got here with the background information on SMR SECY-16-0069 where the Commission approved the staff's rulemaking plan to move forward. Since then the staff has had significant interactions with internal and external stakeholders regarding this rulemaking

effort.

The staff will continue interactions with the Federal Radiological Preparedness Coordinating Committee to discuss issues of mutual interest to the NRC and our federal partners.

The staff also coordinated with other NRC, as you heard before, such as the ongoing regulatory improvement for production and utilization facilities transitioning to decommission, or the DECOM rule, and the non-power production of utilization facilities license renewal, or the NPUF rule.

As well as the Tennessee Valley Authority early site permit review that we touched a little bit on earlier to ensure that what we do in this rulemaking will not undue the great work that has already been done to other projects. As such, we continue to assess and coordinate this rulemaking effort with those activities moving forward.

Current status of this rulemaking is that the staff is still working on finalizing this draft proposed rule. The staff has released a draft rulemaking document to support today's rulemaking, but please note that these documents have not been subject to the Commission's senior management and legal review and approval and the contents should not be taken as

final official agency position.

Following this meeting the staff plans to continue working on these documents as well as other documents related to this rulemaking effort.

The staff now has to provide a final proposed rule package including the associated draft guidance document to EDO on September 28th and to Commission for approval on October 12th. As Trish mentioned earlier, we are currently on track to meet these dates.

Pending Commission approval the proposed rule package and associated draft guidance documents will be issued for official public comments in estimated early in 2019.

After the official public comment period closes and based on the public comments received, the staff will develop a draft final rule which the staff plans to submit to the Commission for approval in early 2020.

I believe our next scheduled discussion with the ACRS regarding this proposed rule after today's meeting will be at the full committee meeting in October. I've heard some requests -- some desires from ACRS members that we should still go back to the ACRS for further clarification or discussion of those

aspects of this rule after this rule has been published. That is a discussion that needs to be done at Trish's level and the committee level on how we can best accommodate your request.

CHAIRMAN BLEY: Okay. That's good. Work with Derek on that as time goes on. I don't know when that will happen here. They are not due for their final rule until 2020. That's not that far away, is it?

DR. HOLAHAN: No.

DR. CARRERA: In rulemaking timeline anything beyond three weeks is purely a guess.

CHAIRMAN BLEY: I would suggest, and you can talk with Derek some about this, for October if anything you folks do internally leads to anything anticipated changes, go through those in great detail in October.

Over two-thirds of us are here today so it will be a review for the rest of us. There are several members who are not here today who will be hearing this for the first time in October and we're expected to write a letter about what we've heard at that time.

Anything else from members for the staff? Okay. I think we're finished. We have some public

comments from members of industry, and then we'll have comments from anyone on the line or here in the room who wants to make them.

My understanding is that we have five people who wish to speak. The first one on my list is Farshid Shahrokhi from Framatome. I hope I didn't mangle your name too much but please come forward.

MR. SHAHROKHI: Thank you, Dr. Bley. My name is Farshid Shahrokhi. I'm the high-temperature gas reactor director of technology for Framatome. Obviously we support and encourage this rulemaking, this proposed rulemaking, and the basis for our support is our reactor design.

Our reactor is a high-temperature gas fuel reactor prismatic. It's a four-modular plant. Many safety systems, impassive and inherent safety, and at the core of that is our fuel. It's been under irradiation qualification the last 15 years. We have another three or four years to go.

Interim results from this radiation exceeds our expectations. Our reactor is basically designed to produce process heat in the form of high-temperature steam and, of course, we can product electricity also. Therefore, we need to be collocated near our end users.

Performance of our reactor establishes EPZ at our plant boundary which is 400 meters which is our site boundary. The dose rate for our boundary based on expected performance of our fuel and our reactor design is much less than one rem over any two-hour period.

Based on that, of course, that doesn't mean that the potential owner operator of our reactor will not have an emergency plan. It will be similar to the emergency plan of any industrial facility. It will not be a basis of this license. It will be a cooperation with the local and state authorities to establish an emergency plan on that site. Thank you.

CHAIRMAN BLEY: Thank you. I should mention most of the people who are going to speak now have submitted written comments and those will be attached to our minutes when they are published on the NRC website.

Next is Steve Mirsky from NuScale. Steve.

MR. MIRSKY: Thank you, Dr. Bley. My name is Steven Mirsky. I am currently the senior technical adviser for NuScale Power. Previously I was manager of Regulatory Affairs. Of all the vendors you may be hearing from tonight -- excuse me, today, we are the one vendor of an SMR that is actually under review by

the NRC. We submitted our design certification in January of 2017.

I heard a number of comments made by some members regarding concerns about how this proposed rulemaking could actually be applied. I think it's important to present the ACRS with as much information of what has really been going on the last few years to help you in seeing a perspective.

NuScale started engaging with the NRC and preapplication on Emergency Planning Zone back in 2011, six years before our submittal. NuScale has worked closely with NEI to develop NEI white papers that were submitted to the small modular reactor Emergency Planning Zone methodology.

NuScale's presentations to the NRC have occurred over several years. In 2015 NuScale submitted a plume exposure Emergency Planning Zone methodology topical report. We support this proposed rulemaking because it exactly aligns with our methodology topical report.

A methodology topical report is performance based, risk informed, and consequence oriented. It's been under review by the NRC since 2015. It's been revised once and we are now in the mode of waiting for the development of the safety

evaluation report which you will all, of course, be seeing in future ACRS meetings.

I would like to assure ACRS members that the methodology doesn't appear to be extremely detailed and is sufficient for a vendor to develop a topical report and a means to justify a pre-exposure Emergency Planning Zone at distances different from 10 miles.

I also would like to make one comment about PRA and NUREG-0396. We looked very closely at NUREG-0396. We've been able to duplicate the figures specifically in Appendix I, the famous knee curve which was the basis for the 10-mile plume exposure.

I think it's important to note that the state of technology of PRA in 1974 and the state of knowledge of the input to PRA. That is actually very crude compared to what we have today. The PRA that NuScale has done and revised many times involves much fewer systems, much fewer structures, much fewer components and considerably more --

AUTOMATED HONE MESSAGE: Pardon the interruption. Your conference contains less than three participants at this time. If you would like to continue, press *1 now or the conference will be terminated.

MR. MIRSKY: That's all I've got to say.

CHAIRMAN BLEY: It worked.

(Laughter.) Thanks, Steve.

Next we'll have Brian Johnson from TerraPower.

MR. JOHNSON: Hello. I'm Brian Johnson from TerraPower. I'm the nuclear risk assessment lead which is sort of short for Chapter 19. There's a lot of stuff in there. I just wanted to come and say we do support and encourage this rulemaking. A lot of thanks certainly to NuScale and NEI developing the methodology. We've written an emergency preparedness plan that we would like to implement.

In looking at this draft rulemaking it's extremely aligned with the NEI guidance with what NuScale has been doing and the path that TerraPower would like to go forward with our reactor designs.

For those who are not familiar, we are pursuing both TWR more in China, but that could eventually become a global product, as well as the MCFR. TerraPower is an innovation company so we limit ourself to two reactors. We are very excited to see this rulemaking.

We do think that the PRA elements that a lot of people are concerned about being crude, I was

sort of going to say something reverse to what NuScale said. With the 0396 there are using the most relevant cold data, the most relevant data they could get to make their PRAs for the nuclear reactors.

As we develop new technologies, we shouldn't let the lack of operating data for those specific technologies prevent us from creating PRAs that we can use to inform our design, we can use to inform our failures, and the expected reliability of a lot of equipment in these reactor types. I think this is very exciting. I think it's doable. I think it will provide a lot of flexibility and also practicability for licensing new designs.

CHAIRMAN BLEY: Thank you.

Next should be Darrell Gardner of Kairos.

MR. GARDNER: Thank you. I'm Darrell Gardner with Kairos Power. We submitted comments in writing. This is just a brief summary of some of the highlights here.

I'm director of Licensing Applications and we wanted to point out that we're developing a TRISO-based fuel molten salt cool reactor design. It's a new technology. We think this will enable us to support our mission to transition the world to clean energy sources and make a difference in

improving people's quality of life around the world.

We expect to demonstrate minimal exposure to the public as a result of postulated accidents and as a result of the reduced source term, longer acts of progression times, increased use of passive safety in the design.

The deployment of this and other technologies requires removal of artificial barriers to emergency planning requirements not commensurate with the risk of these technologies.

We encourage the NRC's proposed rule and support the efforts here today.

CHAIRMAN BLEY: Thank you.

Last should be Brandon Waites from Southern Nuclear.

MR. WAITES: Thank you for the opportunity to speak today. My name is Brandon Waites. I am with Southern Nuclear Development. I am providing consulting services to X Energy for their design in the area of regulatory affairs.

Today I would like to provide a few comments for X Energy about this proposed rule. X Energy supports to propose performance based EP rule. X Energy is pursuing the deployment of Xe-100 reactor, a pebble bed high temperature gas cooled reactor

design that emphasizes highly reliable passive and inherent safety features.

Leveraging this inherent safety case is instrumental to X Energy's business case. The proposed draft guidance and rulemaking, if adopted, will provide vendors and users the ability to leverage lower risk profiles and remove obstacles currently associated with the deployment of advanced reactor technologies under existing rules.

X Energy commends the work done in this area for advanced reactor technologies and looks forward to similar work done in other areas to further enable advanced reactor deployment. Thank you.

CHAIRMAN BLEY: Thank you.

At this point I would like to get the phone line open. While we're waiting for that, if there's anyone in the room who would like to make a comment, please come to the microphone and identify yourself and make a comment.

Is there anyone on the phone line who would like to make a comment? If so, please identify yourself and make your comment.

MS. FIELDS: Yes. This is Sarah Fields --

CHAIRMAN BLEY: I'm sorry. If you're using a speaker phone, can you go to the handset?

You're cutting out a lot. Can you go ahead? Do you want to try again?

Is there anyone else who would like to make a comment? I'll give her just a minute and see if she's trying to dial back in.

MS. FIELDS: This is Ms. Fields. My connection dropped off. I hope I can continue my comments.

CHAIRMAN BLEY: Yeah, go ahead. This is much better. We can hear you now.

MS. FIELDS: Okay. Is the NRC taking into consideration the indefinite storage for fuel at a small modular reactor and maybe at some other advanced reactor site? For example, NuScale intends to use conventional nuclear fuel. Not that it's wrong but it will still be conventional fuel.

Eventually it will go into the spent fuel pool for five years and then be removed into canisters and the design of those canisters has not been identified. Currently there is no place to move that fuel, only in terms of indefinite storage of that fuel.

I don't see where you are taking into consideration the possibility of different types of accidents or releases related to that fuel. I would

like maybe some comment from the ACRS about this.

CHAIRMAN BLEY: Thank you for your comment. We don't engage in discussions. We are collecting information but your comments will appear in our transcript and we will consider them. Thank you.

MS. FIELDS: I read your comments in your final determination. Thank you.

CHAIRMAN BLEY: Thank you.

Anyone else care to make a comment? Okay. We'll close the phone line now. Thank you.

At this time I'm going to go around to the members and see what comments they have.

Pete Riccardella, are you still on the line and can you make comments?

MEMBER RICCARDELLA: I am. I guess I have some thoughts, you know, regarding modular reactors we earlier had the discussion of single unit versus multiple modules on a single site.

It seems to me that if the methodology is truly risk informed and performance based that it should be possible to address different accident frequencies for single versus multiple module accidents, as well as the different source terms that are involved. I don't see that to be a big issue in

this regard.

Then I'm also keenly intent on Dick's point about future changes that might influence the emergency plan and initial citing versus continual assessment. That's all I have.

CHAIRMAN BLEY: Thanks, Steve. Thanks for being there.

Walt.

MEMBER KIRCHNER: I would just thank the presenters. I don't have any further comments at this point. Thank you.

CHAIRMAN BLEY: Charlie.

MEMBER BROWN: I have no further comments. Thank you.

CHAIRMAN BLEY: Thank you, Charlie.

Jose.

MEMBER MARCH-LEUBA: I have no specific comments.

CHAIRMAN BLEY: Joy.

MEMBER REMPE: So I also side with or like the second what Pete said about that I think the draft rule should explicitly say multiple modules need to be considered with a parenthetical statement. I agree that the continuous updates to emergency planning should be noted.

I guess I would like to see some additional guidance on the source term more than what I saw in Appendix A. For example, I think that some discussion of cutoff frequency might be useful here, or some place.

I am also curious about the 96 hours. Why the first 96 hours and should we be thinking about just reactor which might have something that comes out at 100 hours. I mean, why just that first 96 hours?

Last, there are those two papers and they are not yet released. I would like to make sure those two references are released publicly before we meet again. Okay? Thank you.

CHAIRMAN BLEY: Thanks.

Mike.

MEMBER CORRADINI: No, I don't have any additional comments. I think we've talked about our concerns and interests earlier. Thanks to the staff.

CHAIRMAN BLEY: Thank you.

Matt.

MEMBER SUNSERI: I would like to thank the presenters and a few general comments. I do generally support the need for and the direction of this rule. I think it's important and necessary.

I suppose my biggest concern, which is

probably too strong a word, but the observation I'll make is regarding the discriminator for applicability. The success or failure of a rule like this will depend on the implementation guidance and the quality of that guidance.

I think you heard a number of comments today about what is the discriminator, megawatts or whatever, source term this or that. We heard, I think, at least in my mind conflicting information regarding the source term, whether the citing criteria is bounding or not, multiple modules. Some of my colleagues have already commented on this.

I suppose my closing point here is I look forward through the comment period and after you get the public and industry and everybody's comments after the Federal Register addressing these issues in a way that would make sense and make it absolutely clear how we are going to implement this rule and who is going to do that.

Just one final comment. I wasn't in the military but maybe Charlie can comment on this. I've often heard military planners say the battle plan goes out the window when the first shot is fired. I think a similar analogy applies here.

I don't know that we need to necessarily

have emergency plans that address the worse conceivable thing that we could ever think of, but what is the most credible thing that can happen at these plants from a radiological consequences perspective.

If we can adequately prepare for that, then that planning and that thinking process will carry over to whatever absurd thing that we might be able to think of.

I've seen this happen in the communities where I've worked where non-radiological events have occurred; tornadoes, storms, floods, whatever, but the community responded to those in a way of implementing what they learned through working with the nuclear power plant that was really beneficial to the community. I think that type of thought adds value. That's all I have. Thank you, Dennis.

CHAIRMAN BLEY: Thank you.

Dick.

MEMBER SKILLMAN: First of all, to Dr. Holahan and the whole staff, thank you very much for a very beneficial morning.

Second comment I would like to make is we learned at TMI-2 the importance of the containment. The containment of TMI-2 saved the day. It held the

water from going in the Susquehanna River and it prevented any real offsite dose release.

To that point, the way this documentation is written, as Dr. Bley said, it seems to be all around EP. It really needs to focus on source term. Let me give you an example. We just had several SMR vendors in here talking about their product. Salute to them.

Let's suppose the staff and the ACRS gets real antsy and basically says, "We don't like that design because we have questions about the source term." That vendor then says, "Okay. We'll put a second containment on it. We say, "We still don't like that." They says, "We've got deep pockets. We'll put another containment."

At some point the designer has the capability to make that source term of no consequence. This rule should allow that. It should allow a designer to be so innovative that the offsite releases are so low that one would say that is a safe facility.

In my view, the source term carries the day in this discussion as the reactor building carried the day on March 28th of 1979. I don't think the importance of that can be understated. A good strong box, a good strong steel container, is just what the

doctor ordered.

Let the legislation, let the documentation that you're creating, let the rule that you're proposing focus solidly on source term that all of kind of say, yeah, if we follow that path, we will have a successful facility in terms of radiologic consequence no matter what the fuel is. Thank you.

CHAIRMAN BLEY: Thanks, Dick.

Ron.

MEMBER CORRADINI: Green light.

MEMBER BALLINGER: I'm not the first and not the last.

CHAIRMAN BLEY: But you're consistent.

(Laughter.)

MEMBER BALLINGER: Well, since Stetkar left. Where was I? I appreciate the presentations a lot but I have no further comments.

CHAIRMAN BLEY: Thanks, Ron.

I, too, would like to thank all the presenters today and thank you for your patience and lengthy discussions. I'm sure we'll have more in the future. I won't reiterate the things I've already said but I stand by them. We'll look forward to seeing you in October. We'll have some discussions through Derek on our part for what to expect at that

time.

Like I say, if anything out of this meeting or anything that evolves as you go forward makes changes of any kind in the rule language or in the guidance, please bring that and show us clearly. I assume it won't be much. If it heads that way, then we need to see something in writing. But I think if it's all minor things, you can show us at that time.

I would like to finally thank everyone else who was here for a good session. We are adjourned.

(Whereupon, the above-entitled matter went off the record at 11:44 a.m.)

ACRS

Future Plant Designs and

Regulatory Policies and Practices Subcommittees

August 22, 2018

My name is Farshid Shahrokhi - I am the director of the high temperature gas-cooled reactor (HTGR) technology at Framatome Inc.

Framatome's steam cycle HTGR relies on the performance and radionuclides retention characteristics of TRISO particle fuel currently undergoing irradiation testing for qualification at Idaho National Laboratory.

Interim results from multi-year irradiation and testing campaign indicate better than expected results. Framatome's steam cycle HTGR is designed to deliver process heat and electricity at the highest level of reactor safety utilizing intrinsic and passive safety design features.

The combined radionuclides retention capabilities of TRISO particle fuel, intrinsic, and passive safety of our design concept limits the accident dose to less than 1.0 Rem (EPA PAG dose limit) in any two hour time interval during and following any design bases accident at the plant site boundary of 400 meter.

In other words the SC-HTGR is designed to not interfere with the environment beyond the plant's site boundary.

We expect the plant owner/operator to develop a robust off-site emergency plan, not as a condition of the NRC license but in co-operation with the state and local authorities similar to the emergency plans of any other large industrial complex in the U.S.A.

Existing regulations on emergency planning (EP) do not allow the owner/operator to benefit from the added safety and security of the advanced reactors limiting incentives for deployments of these safer designs.

We therefore applaud and strongly support the NRC's proposed EP rulemaking.

Kairos Power

KP-NRC-1808-001

August 21, 2018

Mr. Derek Widmayer
Advisory Committee on Reactor Safeguards
US Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Kairos Power LLC Comments on Draft Proposed Rule, *Emergency Preparedness for Small Modular Reactors (SMRs) and Other New Technologies (ONTs)*

Kairos Power appreciates the opportunity to provide comments for consideration by the Advisory Committee on Reactor Safeguards (ACRS) in their review of the subject proposed rule. Kairos is developing an advanced reactor in support of our team's mission, which is to enable the world's transition to clean energy, with the ultimate goal of dramatically improving people's quality of life while protecting the environment. We seek to address energy poverty, reduce the impact of climate change, create real and lasting jobs, and reestablish American technology leadership. But doing that requires that we remove artificial impediments to deploying this safe technology.

Kairos is developing a solid, TRISO-fueled, molten salt-cooled, high-temperature reactor. We expect to demonstrate minimal public exposure during conservatively postulated events.

Kairos strongly supports the proposed rule. We know from the direct involvement of members of our team that this rule represents years of collaboration on an approach that recognizes enhancements in safety of advanced designs while still requiring applicants to demonstrate compliance with rigorous requirements before the new approach can be used. The proposed rule acknowledges safety enhancements such as reduced core inventories and source terms, reduced potential for accidents, longer progressions of events postulated to lead to releases, and increase in the use of passive safety. Further, as indicated in the proposed rule package, the rule would apply the same dose standard for predetermined protective actions as is required of the current operating large reactors. It results in no less protection of public health and safety as compared to existing requirements for the current operating fleet.

The real risk associated with many other industries is much higher than a reactor, yet our industry historically presupposes that a higher burden is necessary. The proposed rule is logical in that it removes barriers to deployment by establishing requirements commensurate with the risk of the technology.

Importantly, the lack of a pre-approved offsite emergency plan – which is an important aspect of the change being contemplated in this rule – does <u>not</u> imply a lack of emergency planning, but rather a level of emergency preparedness more aligned with other comparable risks.

Kairos is pleased to support this rulemaking and we hope the ACRS finds these comments to be useful.

Respectfully submitted,

Peter Hastings, PE
Vice President, Regulatory Affairs & Quality

Kairos Power LLC
580 2nd Street, Suite 290 | Oakland, California 94607 | 510-808-5265
www.kairospower.com

NuScale Power, LLC Comments on the August 22, 2018 ACRS SC EP Rulemaking Meeting

NuScale Power fully supports the NRC proposed rulemaking on small modular reactor (SMR) and other nuclear technology (ONT) Emergency Planning (EP). This proposed rule, along with draft regulatory guide DG-1350, was developed in response to a series of Commission-approved documents (i.e., SECYs and SECY-SRMs) that were issued since 2005, as well as to extensive nuclear industry input. It is based on evaluation of the technical basis for current emergency planning regulations for large light water reactors (LLWRs) and application of this identical basis to SMRs and ONT. New rulemaking for SMR and ONT EP is in alignment with revisions of many other LLWR regulations, which have been updated to reflect the enhanced safety, simplicity and smaller radionuclide source terms of SMR and ONT designs.

The NuScale SMR was designed to: eliminate many safety issues; greatly reduce the likelihood and consequence of applicable accidents; simplify operations; and expand reliance on passive systems and natural processes resulting in unparalleled resiliency. All these features greatly reduce risks to public health and safety. This proposed EP rulemaking is in alignment with the NuScale plume exposure EPZ methodology topical report that is currently under review by the NRC. Both the proposed EP rulemaking and the NuScale EPZ topical report describe a performance-based, risk informed, consequence-oriented approach.

Public perception of nuclear power plant risk is closely tied to EP because signs, sirens, and emergency drills associated with the current 10-mile plume exposure emergency planning zone (EPZ) are a tangible and visible manifestation of potential danger to individuals. The NRC has determined that many licensed nuclear facilities including: low electric power commercial nuclear plants; research and test reactors; decommissioned nuclear power plants; orphan (i.e., with no collocated nuclear power plant) independent spent fuel storage installations (ISFSIs); and medical or industrial radioisotope users have an inherently low public health risk. This low risk results in a reduced EPZ by setting it at a smaller distance, the site boundary, or replacing the EP with existing facility all hazard plans. This proposed rulemaking uses the identical regulatory basis and technical justification to allow SMRs and ONTs the same opportunity to have an appropriately sized EPZ. An appropriately sized EP for an SMR or ONT will afford the same protection to the public as the current 10-mile plume exposure EPZ at operating LLWRs.

Since its inception in 1980, the underlying goal of EP has always been to protect the public. The proposed rulemaking provides the identical level of protection while recognizing that 21st century nuclear power plant technology has and will offer game changing advances in safety. Crediting the new paradigm in SMR and ONT safety by an appropriately sized EPZ accurately informs the public on the relative risk of new nuclear power plants. Imposing unnecessary public EP responses (e.g. evacuation) to low risk nuclear facility events has been shown to increase risks to public health and safety, which is antithetical to the basic tenet of EP.

TerraPower

August 17, 2018

Mr. Derek Widmayer, NRC/ACRS
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Comments on Draft Proposed Rule for EP for SMRs and ONTs

Dear Mr. Widmayer,

TerraPower LLC is pleased to provide comments to the Advisory Committee on Reactor Safeguards (ACRS) in support of the Draft Proposed Rule, "*Emergency Preparedness for Small Modular Reactors and Other New Technologies*." TerraPower is developing multiple advanced reactor technologies. We support the Draft Proposed Rule and encourage NRC Commissioners to approve publication in the Federal Register of the proposed rule and draft guidance related to amending regulations for emergency preparedness for small modular reactors and other new technologies.

Existing regulations impose unnecessary regulatory burden and cost on applicants and licensees. This hinders development and deployment of advanced reactor technologies. Implementation of new emergency preparedness requirements as described in the proposed rule and draft guidance will increase the cost competitiveness of advanced reactor technologies by promoting the establishment of a clear, predictable and stable licensing process for advanced reactor technologies.

The new regulations will also enable advanced reactor technology developers to take advantage of technological advancements which may be used with the amended regulations and implementing guidance to further increase the cost competitiveness of advanced reactors. The level of public protection will be equivalent to that provided by existing emergency planning requirements by using the same public protection standard and EPA Protective Action Guidelines used by the current operating fleet of large light water reactors.

In addition, the international regulatory community continues to refer to NRC regulations for guidance and input when developing international regulations. If approved, the proposed changes may be reviewed and evaluated by international regulators. As a result, this rulemaking has the potential to benefit and influence international projects in addition to domestic projects.

330 120th Avenue NE, Suite 100, Bellevue, WA 98005 www.TerraPower.com P. +1 (425) 324-2888 F. +1 (425) 324-2889

For the reasons stated above, TerraPower supports the Draft Proposed Rule and encourages publication in the Federal Register by the NRC. Thank you for consideration of these comments. If you have any questions, please feel free to contact me at 425-324-2732 or via email at pgaillard@terrapower.com.

Sincerely,

Peter C. Gaillard
Manager, Licensing

.

330 120th Avenue NE, Suite 100, Bellevue, WA 98005 www.TerraPower.com P. +1 (425) 324-2888 F. +1 (425) 324-2889

ACRS Subcommittee
August 22, 2018

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

10 CFR Parts 50 and 52

NRC-2015-0225

RIN 3150-AJ68

- Project Manager: Andy Carrera (NMSS)
- Technical Leads: Kenneth Thomas (NSIR)
  Steve Lynch (NRR)
  Arlon Costa (NRO)

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Purpose of Rulemaking

  Amend regulations for new alternative performance-based EP requirements for future SMRs and ONTs.

- Proposed rule would be:
  - Technology inclusive for future:
    - SMRs
      - Nuclear power reactor < 1000MWt that may have modular design
    - ONTs
      - Non-light-water power reactors
      - Non-power Production or Utilization Facilities
        - » Medical Radioisotope Facilities

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Major provisions of this proposed rule:
  - technology-inclusive for future SMRs and ONTs, including medical isotope facilities
  - alternative performance-based EP framework, including demonstration of effective response in drills and exercises
  - hazard analysis for contiguous facilities
  - scalable approach for plume exposure pathway EPZ
  - ingestion response planning option for SMRs and ONTs that opt to use §50.160.

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Background
  - SECY-10-0034, "Potential Policy, Licensing, and Key Technical Issues for Small Modular Reactor Designs"
  - SECY-11-0152, "Development of an Emergency Planning and Preparedness Framework for Small Modular Reactors"
  - Final Rule in 2011 Enhancements to EP, post-Fukushima EP enhancements
  - SECY-14-038, "Performance-Based Framework for Nuclear Power Plant Emergency Preparedness Oversight"

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Background
  - SRM-SECY-14-0038, "Performance-Based Framework for Nuclear Power Plant Emergency Preparedness Oversight"
  - SECY-15-0077 and SRM-SECY-15-0077, "Options for Emergency Preparedness for Small Modular Reactors and Other New Technologies"
  - SECY-16-0069 and SRM-SECY-16-0069, "Rulemaking Plan on Emergency Preparedness for Small Modular Reactors and Other New Technologies"

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- What about Operating Reactors?
  - They meet existing rules.
  - Developing and implementing would divert resources from other higher priority projects for the NRC and licensees.
  - Staff received a comment from NEI on draft regulatory basis document.
  - FRN would include a question whether to include within the rule's scope.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Scalable approach for plume exposure pathway EPZ
  - Same level of protection afforded to other reactors under existing rules
  - Consistent with the existing graded-approach afforded to other facilities

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- EPZ size technical analysis
  - The plume exposure pathway EPZ should encompass an area where prompt protective measures, such as evacuation and sheltering, may be needed to minimize the exposure to individuals.
  - The analysis should consider radiological releases from credible accidents for the facility.

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Existing EPZ guidance for nuclear power plants
  - NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants"
    - Sets generically applied distances
      - Dose Savings
      - Incorporated into the 1980 final rule
      - Describes the considerations for determining EPZ sizes

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Planning basis for EP for SMRs and ONTs consistent with the analyses documented in NUREG-0396
- Development of guidance supported by User Need Request NSIR-2017-002
  - Generalized Dose Assessment Methodology for Informing Emergency Planning Zone Size Determinations
  - Required Analyses for Informing Emergency Planning Zone Size Determinations

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Ingestion response planning
  - Early phase of the response
    - Precautionary protective actions
      - Washing garden products and food
      - Placing livestock on stored feeds
  - Longer term actions
    - Leading indicator drives response
  - Biological contamination similarities

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- National Preparedness Goal
  - National Planning Frameworks
    - Prevention
    - Protection
    - Mitigation
    - Response
    - Recovery
  - Federal Interagency Operations Plans

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Existing EP requirements for nuclear power plants in 10 CFR Part 50:
  - §50.47, "Emergency Plans"
  - Appendix E to Part 50, "Emergency Planning and Preparedness for Production and Utilization Facilities"
  - §§50.33, 50.34, and 50.54

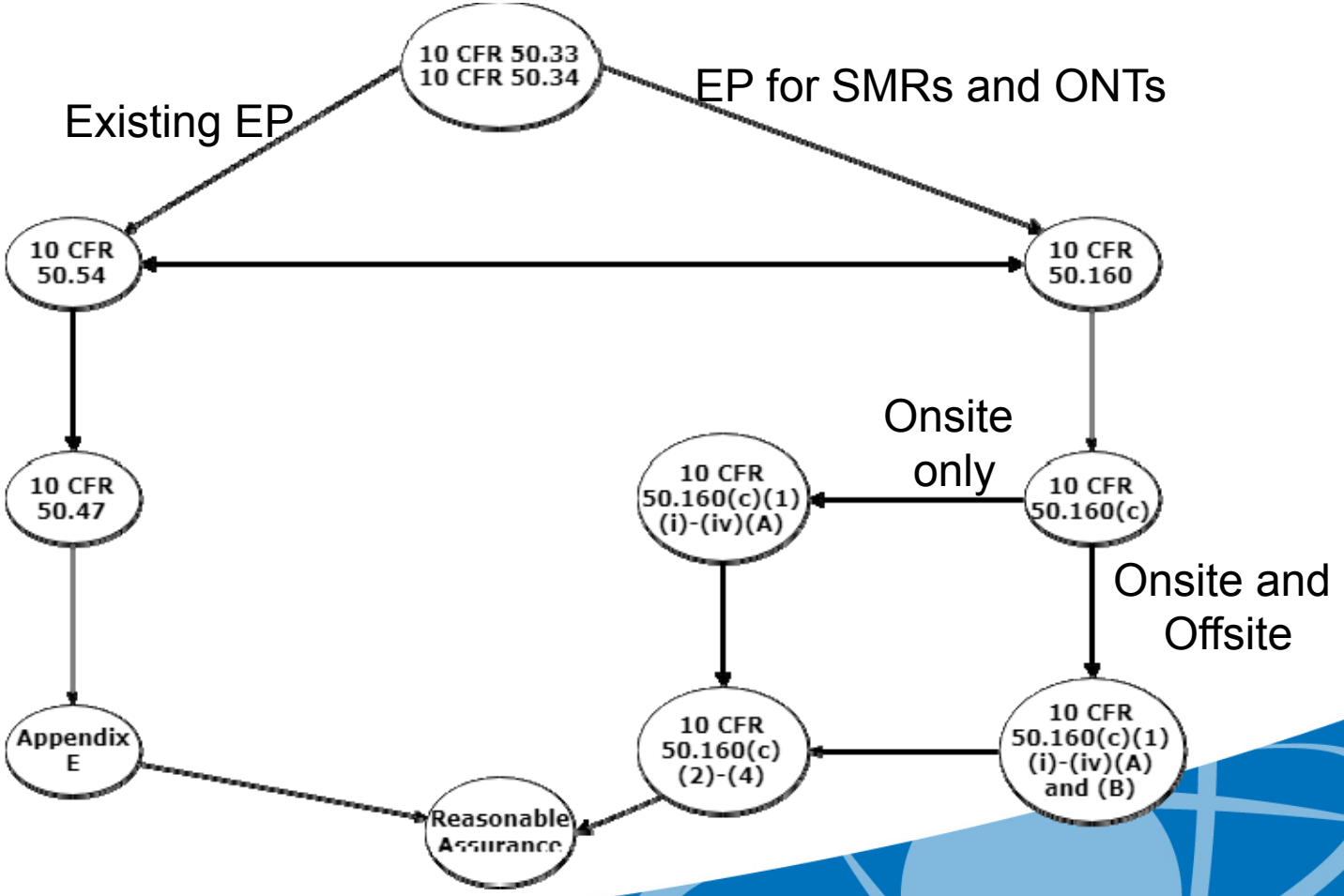
Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Regulatory Basis: "Rulemaking for Emergency Preparedness for Small Modular Reactors and Other New Technologies"
  - Draft issued April 2017
  - Final issued November 2017
- Key comments

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment



U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Draft Proposed Rule Changes:
  - §50.2 Definitions
    - Non-light Water Reactor
    - Non-power Production or Utilization Facility
    - Small Modular Reactors
  - §50.33 Contents of Applications; general information
  - §50.34 Contents of Applications; technical information

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Draft Proposed Rule Changes:
  - §50.47 Emergency Plans
    - Conforming changes to paragraph (b)
    - Reserves paragraph (c)(2)
    - New paragraph (f)
  - §50.54 Conditions of licenses
    - Conforming changes to (q), (s), and (gg)
    - Clarifying when FEMA determinations would be needed.

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (a) Applicability
  - (b) Definitions
    - Site-boundary refers to the Part 20 definition

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (c) Requirements
    - (1) Performance-based framework
      - (i) Maintenance of performance: The licensee must maintain in effect preparedness to respond to emergency and accident conditions and describe in an emergency plan the provisions to be employed to maintain preparedness

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (c) Requirements
    - (ii) Performance indicators: The licensee must maintain and update at the end of each calendar quarter, a complete list of performance indicators for the previous eight calendar quarters;

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (c) Requirements
    - (1)(iii) Emergency response performance
      - (A) *Event classification and mitigation*
      - (B) *Protective actions*
      - (C) *Communications*
      - (D) *Command and control*
      - (E) *Staffing and operations*
      - (F) *Radiological assessment*
      - (G) *Reentry*
      - (H) *Critique and corrective actions*

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (c)(1)(iv) Planning activities
    - (A) Onsite-
      - (*1*) Public information
      - (*2*) Implement emergency response plan with safeguards contingency plan

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (c)(1)(iv) Planning activities
    - (A) Onsite-
      - (*3*) Voice communications with the NRC (Emergency Notification System)
      - (*4*) Emergency facility

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (c)(1)(iv) Planning activities
    - (B) Offsite (if the plume exposure pathway EPZ extends beyond the site boundary)
      - (*1*) Contacts and arrangements
      - (*2*) Notification of offsite organizations

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (c)(1)(iv) Planning activities
    - (B) Offsite (if the plume exposure pathway EPZ extends beyond the site boundary)
      - (*3*) Protective measures
      - (*4*) Offsite organizational training
      - (*5*) Evacuation time estimate

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (c)(1)(iv) Planning activities
    - (B) Offsite (if the plume exposure pathway EPZ extends beyond the site boundary)
      - (*6*) Emergency response facilities
      - (*7*) Offsite dose projections
      - (*8*) Public information

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (c)(1)(iv) Planning activities
    - (B) Offsite (if the plume exposure pathway EPZ extends beyond the site boundary)
      - (9) Reentry
      - *(10)* Drill and exercise program
      - (*11*) Maintaining the emergency plan

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (c) Requirements
    - (2) Hazard analysis (collocation, modularity, industrial)

    Licensees and applicants complying with this section must conduct a hazard analysis of any contiguous facility, such as industrial, military, and transportation facilities, and include any credible hazard into the licensee's emergency preparedness program that would adversely impact the implementation of emergency plans.

Emergency Preparedness for Small Modular Reactors and Other New Technologies Proposed Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- §50.160
  - (c) Requirements
    - (3) Emergency Planning Zone
    - (4) Ingestion response planning
      - Federal, Tribal, state and local capabilities
      - National Response Framework
        - » Federal Interagency Operation Plans
        - » Nuclear/Radiological Incident Annex

- §50.160
  - (d) Implementation
    - (1) Future applicants must meet the requirements no later than 18 months before the issuance of an operating license.
    - (2) A holder of a combined license must meet the requirements no later than 18 months before fuel loading.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Specific Requests for Comments
  - Section IV of the FRN
    - Scope of the proposed rule
    - Performance-based requirements
    - Drills or exercises
    - Planning activities
    - Hazard analysis
    - EPZs

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Specific Requests for Comments
  - Section VII Regulatory Analysis
  - Section IX Cumulative Effects of Regulation
  - Section X Plain Writing
  - Section XI Environmental Assessment
  - Section XII Paperwork Reduction Act
  - Draft Regulatory Guide

Licensing Modernization Project

- The LMP's objective is to develop technology-inclusive, risk-informed, and performance-based regulatory guidance for licensing non-LWRs for the NRC's consideration and possible endorsement
- LMP Participants:
  - Southern Company - lead
  - Nuclear Energy Institute - coordination
  - U.S. Department of Energy - cost-sharing
- Integrated approach to licensing basis development
  - Licensing basis event selection
  - Classification of structure, systems, and components
  - Assessment of defense-in-depth
- ACRS public meetings
- Schedule calendar year 2019:
  - DG-1353 - to consider endorsing NEI-18-04 publication

Status and Path Forward

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Proposed rule package is in concurrence:
  - Due to the OEDO on September 28, 2018 and the Commission on October 12, 2018
  - Draft guidance is planned for issuance with proposed rule in early 2019 (pending Commission's approval)
  - Draft final rule due to the Commission for approval in early 2020
- Future ACRS interactions
  - Full committee – October 2018 (proposed rule)
  - Full committee – to be determined (final rule)

Abbreviations

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

ACRS – Advisory Committee on Reactor Safeguards
CFR – Code of Federal Regulations
COL – combined license
DG – draft regulatory guide
OEDO – Office of the Executive Director of Operations
EP – emergency preparedness
EPZ – emergency planning zone
FEMA – Federal Emergency Management Agency
FRN – Federal Register notice
LMP – Licensing Modernization Project
LWR – light-water reactor
NEI – Nuclear Energy Institute

Abbreviations

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NMSS – Office of Nuclear Material Safety and Safeguards
NRC – U.S. Nuclear Regulatory Commission
NRO – Office of New Reactors
NRR – Office of Nuclear Reactor Regulation
NSIR – Office of Nuclear Security and Incident Response
ONT – other new technology
RG – regulatory guide
RIN – Regulation Identification Number
SECY – Office of the Secretary to the Commission
SMR – small modular reactor
SRM – staff requirements memorandum