

UNITED STATES  
NUCLEAR REGULATORY COMMISSION

+ + + + +

MEETING WITH THE  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

+ + + + +

FRIDAY,  
JUNE 3, 2022

+ + + + +

The Commission met in the Commissioners' Conference Room, First Floor, One White Flint North, Rockville, Maryland, at 10:00 a.m., Christopher T. Hanson, Chairman, presiding.

COMMISSION MEMBERS:

CHRISTOPHER T. HANSON, Chairman

JEFF BARAN, Commissioner

DAVID A. WRIGHT, Commissioner

ALSO PRESENT:

BROOKE P. CLARK, Secretary of the Commission

MARIAN ZOBLER, General Counsel

ACRS MEMBERS:

JOY L. REMPE, Chairman

VICKI M. BIER, Member

CHARLES H. BROWN, JR., Member

GREGORY H. HALNON, Member

DAVID A. PETTI, Member-at-large

MATTHEW W. SUNSERI, Member

## PROCEEDINGS

9:59 a.m.

CHAIRMAN HANSON: Good morning, everyone. I convene the Commission's public meeting with our Advisory Committee on Reactor Safeguards, or ACRS. The ACRS is statutorily mandated by the Atomic Energy Act of 1954, as amended, and the Committee provides independent advice that plays an important role in the Commission's decisionmaking process. It is a pleasure to have you all here. This is a periodic meeting to hear from ACRS members on several important topics, recently reviewed by the Committee.

I would like to take one note to recognize publicly, I don't think we'd had a chance to do this. But that in the, I think the ACRS was first convened in what, 1957 or thereabouts, if I have my history correct. And in that time, or now I would say, we have our first woman chair. So congratulations to Dr. Rempe, and congratulations to the rest of the Committee. I think this marks an important milestone.

I look forward to the discussion today. Thank you all for supporting it. Before we start, I'll ask my colleagues if they have any comments they'd like to make.

COMMISSIONER BARAN: Just to echo the Chairman's congratulations on our other chairman. Congrats, it's great to have you in that role.

CHAIRMAN HANSON: So with that, we'll begin with Dr. Rempe, who is the chair as I just noted. Dr. Rempe, the floor is yours.

1 DR. REMPE: Thank you, Chairman Hanson. I am Joy  
2 Rempe and I am serving as Chairman of the Advisory Committee on Reactor  
3 Safeguards. We appreciate the opportunity to brief you today.

4 Slide 2 of my presentation lists the agenda for today's  
5 meeting. As indicated in this agenda, I'll start with an overview of activities  
6 that ACRS has completed since our last briefing in October 2021. During  
7 my presentation, I'll also discuss our review of the NRC Safety Research  
8 Program. Second, Member Bier will present our report on the, by the staff,  
9 to conduct the 10 CFR Parts 50 and 52, alignment and lessons learned  
10 rulemaking. This will be followed by a presentation by Member Halnon, on  
11 the rulemaking activities to support small modular reactors, and other new  
12 technologies. And finally, Member Petti will close with an overview of our  
13 reviews of staff activities regarding non-light water reactor source term  
14 topics.

15 Since our last meeting in October 2021, we have issued 19  
16 letter reports. As indicated in the first bullet of slide 3, five of these reports  
17 pertain to staff activities to develop rulemaking and associated guidance to  
18 enable the Agency to review small modular reactors, and other new  
19 technologies. In addition, we have issued five letter reports pertaining to  
20 technology specific, and design specific small modular reactors. Including  
21 submittals pertaining to molten salt technologies, as well as the NuScale and  
22 GE BWRX-300 small modular reactor. As mentioned previously, Members  
23 Halnon and Member Petti will be providing some reports on several of these  
24 topics.

1                   As indicated in the first bullet of slide 4, we also are  
2 continuing our reviews of several applications pertaining to the operating  
3 fleet. This includes two submittals pertaining to subsequent license  
4 renewal, as well as several topical reports pertaining to spent fuel pool  
5 heat-up accidents, and a new method for analyzing loss of coolant  
6 accidents.

7                   We've also completed five letter reports pertaining to other  
8 topics, including high burnup fuel, reactor pressure vessel embrittlement,  
9 and cybersecurity. During today's briefing, Member Bier and I will be  
10 discussing the last two items in this slide.

11                   Slide 5 highlights several other ongoing ACRS activities.  
12 We do continue to implement processes to make our reviews more effective.  
13 For example, in the last several months, several members have opted with  
14 optional letters, to provide memos or several paragraphs in our meeting  
15 summary reports, to make, to document our interim comments.

16                   In addition, our requests for formal presentations have  
17 been reduced in several activities, such as our subsequent license renewal  
18 reviews and our ongoing review of the SHINE licensing -- operating license  
19 submittal.

20                   We are not only completing all required reviews, as well as  
21 the optional reviews requested by RES, but also we're resuming several  
22 activities that were precluded during the pandemic, such as our visits to  
23 regional offices, as well as our plant and fuel fabrication visits.

24                   We also are taking actions to prepare for future submittals.

1 We have reorganized our subcommittee structure at the beginning of the  
2 year and we have taken actions to address membership succession  
3 considerations.

4 By the way, we do appreciate your prompt approval of our  
5 request for two new members, and I'm happy to report that that solicitation is  
6 now published in the Federal Register.

7 In slide 6, I'd like to now switch to the second topic of my  
8 presentation, our review of the NRC Safety Research Program. As you  
9 know, the Office of Regulatory Research does provide technical advice,  
10 tools, and information for meeting the NRC's mission. The Atomic Energy  
11 Act of 1974 does mandate the establishment of the Office of Regulatory  
12 Research. And that mandate recognized that a strong technical foundation  
13 was required for a world-class regulator and it expected that RES programs  
14 would provide that foundation.

15 Since 1974, ACRS has conducted formal NRC reviews,  
16 and currently this activity includes reviews of research conducted in support  
17 of specific regulatory activities, periodic reviews of important ongoing  
18 research activities, and our biennial review of the NRC Safety Research  
19 Program.

20 Our biennial review continues to emphasize the 1997  
21 direction by the Commission to evaluate the need, scope, and balance of the  
22 reactor safety research program, the progress of ongoing activities, and how  
23 well RES anticipates research needs in its position for the changing  
24 environment.

1                   Our fiscal year 2022 report also emphasizes prioritization  
2     and identification of user needs, long-term planning, and follow up on prior  
3     ACRS activities. Our fiscal year 22 report was developed by integrating  
4     insights from an initial meeting with the Director of RES, to obtain an  
5     overview of his program, plans, priorities, and areas of interest. This was  
6     followed by briefings with each of the RES divisions to better understand the  
7     specific research projects that they are overseeing and other ongoing ACRS  
8     activities, such as focused reviews of important research projects. Staff  
9     participation in this effort was essential for completing our review, and we do  
10    appreciate their willingness to participate.

11                  In my remaining four slides, I'd like to highlight some of the  
12    conclusions and recommendations in our report. First, we do find that the  
13    RES program continues to meet Agency needs. The program enables staff  
14    to maintain core competencies, it prepares the staff for reviews of anticipated  
15    submittals, and it emphasizes enterprise risks in project selection,  
16    evaluation, and termination. And by using the term enterprise risk, we're  
17    meaning an agency-wide consideration of safety, security, future submittals,  
18    emerging topics, as well as preserving core competencies and development  
19    and maintenance of analysis tools and methods.

20                  Second, as indicated in slide 10, we find that the RES  
21    program and initiatives are enabling the Agency to be ready for emerging  
22    needs and future submittals. And several examples listed in this slide  
23    include the Future Focused Research Program, the Non-LWR Integrated  
24    Action Plans, agency-wide strategies and initiatives, such as the Integrated

1 Code Development and Investment Plan, as well as reorganizations within  
2 RES and expanded applications of new capabilities.

3 Our research review report highlighted the Future Focused  
4 Research Program and effort as an asset to the Agency and recommended  
5 that it be a sustained Agency activity. There are three appendices to our  
6 research review report that outlines specific insights and comments  
7 regarding projects being conducted within each division. Some example  
8 comments are listed on this slide, such as we emphasize the continued use  
9 of collaborations and virtual capabilities to leverage resources and maintain  
10 core competencies, the use of the reference plant evaluation results to  
11 prioritize data needs for small modular reactors and other new technologies,  
12 and the continued emphasis of enterprise risk with respect to project  
13 selection. I also observe that we -- or we recommended that the RES staff  
14 consider fixed end dates for some of the user need request projects that are  
15 selected.

16 The last slide of my presentation emphasizes our  
17 recommendation that the interval between our formal reviews of the  
18 Agency's research program be increased from two to three years. Several  
19 factors support this recommendation. We do continue to find the RES  
20 research portfolio healthy. The rate at which research results are obtained  
21 don't support a review every two years. And finally we continue to perform  
22 more frequent briefings on projects of special interest. For example, in the  
23 last month we reviewed or were briefed by the RES staff on the university  
24 nuclear leadership program and the digital twins Future Focused Research



1 effort. In the next month, we have planned a review of the progress of the  
2 level 3 PRA effort.

3 I'd note that the director of RES, Ray Furstenau, has  
4 reviewed our report and responded back. And in his response he indicated  
5 he concurred with all of our recommendations and conclusions, including this  
6 recommendation to go from a two-year to a three-year interval.

7 That concludes my presentation, so at this time I'd like to  
8 call on Member Bier to begin her presentation. And thank you.

9 DR. BIER: Thank you very much. Can everybody hear  
10 me?

11 CHAIRMAN HANSON: Just fine.

12 DR. BIER: Okay, great, thank you. So I appreciate the  
13 opportunity to talk to you today about the Committee's review of staff efforts  
14 on 10 CFR 50 and 52 alignment, and lessons learned rulemaking activities.  
15 I'm sorry that I was unable to be there in person for this meeting.

16 This effort that I'm going to describe was an enormous  
17 effort on the part of staff because the Committee had numerous questions  
18 and comments during the process. And we really appreciate the staff's  
19 patience and responsiveness in addressing all of the topics that we raised.  
20 After some sometimes heated discussions, we found that a lot of our topics  
21 or comments actually pertained to things that we just had not yet understood  
22 fully about the document. And once we understood it, a lot of those issues  
23 were really resolved. Next slide.

24 As you know, there are currently two licensing pathways

1 available; 10 CFR 50, which involves a separate construction permit followed  
2 by an operating license and 10 CFR Part 52, under which applicants receive  
3 a combined license prior to starting construction. We note that both  
4 pathways were designed for light-water reactors. 10 CFR Part 53 may  
5 eventually provide a more flexible option for other types of facilities, but until  
6 10 CFR Part 53 becomes available, non-LWR applicants may wish to use  
7 Parts 50 or 52. So as things evolve, we may find that those parts may  
8 require some modification, if Part 53 is not yet available for that purpose.  
9 Next slide.

10 Both pathways, Parts 50 and 52, provide reasonable  
11 assurance of public health and safety. However, recent licensing activities  
12 have focused primarily on Part 52. As a result, Part 50 has not yet been  
13 abated to align with some requirements of Part 52.

14 Some of the areas where differences currently exist  
15 include the application of the severe accident policy statement for beyond  
16 design basis accidents, some post-TMI requirements, the reliance on  
17 probabilistic risk assessment, and some requirements for fire protection  
18 design and plan documentation. Therefore, these two pathways may not  
19 provide equivalent protection in all cases and do not fully reflect some of the  
20 lessons learned from recent licensing activities. Next slide again.

21 The objectives of the staff rulemaking process are to align  
22 the licensing requirements in 10 CFR Parts 50 and 52 to incorporate lessons  
23 learned from recent power reactor licensing activities. That's especially the  
24 experience with Vogtle Units 3 and 4. To improve clarity, and to reduce

1 unnecessary burden on both licensees and staff.

2                   This was accomplished through the development of a  
3 number of draft rulemaking documents. In addition to the proposed staff  
4 changes to 10 CFR Parts 50 and 52, the effort also involved changes to  
5 numerous other documents such as Regulatory Guides and Standard  
6 Review Plans to ensure that they were all in conformance. As noted  
7 previously, this was an extensive and complex effort on the part of the staff.  
8 Next slide.

9                   With regard to alignments of Parts 50 and 52, the  
10 proposed changes will require all applicants to address the four alignment  
11 issues discussed previously. In particular, severe accident policy  
12 statement, post-TMI requirements, usage of PRA, and fire protection  
13 requirements. Making those changes is expected to offer several safety  
14 benefits, as well as improved regulatory efficiency.

15                   While the ACRS is generally in favor of these proposed  
16 changes, we did identify several points for the staff to consider that we  
17 thought would benefit from greater clarity in the process of finalizing their  
18 drafts. In particular, the required level of detail for an essentially complete  
19 conceptual design, or as it may be called a preliminary design for a  
20 construction permit applications under Part 50, would benefit from additional  
21 clarity. In addition, we found several places where there were vague or  
22 inconsistent words or phrases used, such as credible or substantial. And  
23 the ACRS noted that this vagueness could in principle lead to different  
24 interpretations, inconsistent application of regulatory requirements, and we

1 therefore suggested that the staff consider providing clearer definitions for  
2 some of these terms. Next slide.

3 In addition to the alignment issues mentioned previously,  
4 several changes were proposed for 10 CFR Part 52, with the intent of  
5 increasing flexibility, reducing regulatory burden, and providing clarity. We  
6 had only two observations in regard to these changes. First, we agree with  
7 the staff decision not to allow a 10 CFR 50.59-like process for changes to  
8 Tier 1 and Tier 2 star information. In particular, we support continuing to  
9 require explicit NRC approval for changes to these items.

10 In addition, we noted that the process improvements being  
11 proposed for Part 52 include reduced reporting requirements for some types  
12 of modeling changes, particularly for engineered core cooling systems,  
13 ECCS. And while these reduced reporting requirements seem suitable for  
14 evolutionary designs that are based on well-established engineering models,  
15 in those cases, we agreed that minor modeling changes would not  
16 necessarily need to be reported.

17 We noted that these reduced reporting requirements may  
18 not always be suitable when you're talking about first-of-a-kind designs,  
19 using novel engineering models for which not very much experience is yet  
20 available, and that those areas may benefit from greater reporting  
21 requirements than what was in the proposed draft that we reviewed. Next  
22 slide.

23 The process under Part 52, these are two additional  
24 observations that we had. First, the process under Part 52 does not

1 currently provide a step prior to fuel load, where the probabilistic risk  
2 assessment must be inspected by NRC. While it's reasonable to expect  
3 that this type of inspection will frequently happen, the lack of a requirement  
4 to inspect the PRA prior to fuel load under Part 52 may reflect a missed  
5 opportunity to confirm that there are no outstanding risk issues associated  
6 with the kind of detailed design and construction decisions that would have  
7 been made after completion for the PRA at the conceptual design stage.  
8 And this is true especially since some licensees may not choose to pursue  
9 risk informed applications. If they do, then the PRA would come under  
10 greater scrutiny as part of the risk informed process, but not all applicants  
11 may choose to take advantage of that route.

12                   We also note that it may be worthwhile to pay more  
13 attention to the issue of licensing of reactors that may be transported to or  
14 from a site with a core already loaded. The existing regulations were not  
15 designed with the intent of such fueled transportable microreactors. While  
16 such reactors are governed by separate regulations for the manufacture,  
17 transport, and operation stages, it may be worthwhile to have a roadmap or  
18 additional guidance to clarify how these different regulations would be  
19 expected to articulate with each other. We support the staff's ongoing  
20 holistic look at this issue to see whether additional roadmap or guidance  
21 might be worthwhile. Next slide.

22                   This is the last slide of my part of the presentation. So  
23 just to summarize, the ACRS believes that the proposed staff changes  
24 address the stated objectives of the rulemaking activity. In particular,

1 aligning the licensing requirements of Parts 50 and 52, incorporating lessons  
2 learned from recent licensing reviews, improving clarity, and reducing  
3 unnecessary burden. We therefore recommend that staff proceed with this  
4 rulemaking package with consideration of the kinds of comments that I  
5 mentioned previously.

6 That concludes my part of this morning's presentation, and  
7 with that, I am happy to pass along to member Greg Halnon for his  
8 presentation. Thank you.

9 MR. HALNON: Thank you, Vicki. We're going to have  
10 an echo. Good morning again. Again, very privileged to be here. Often  
11 humbled by the sheer intelligence of the folks that I work with, and the  
12 professionalism and the thoughtful process that the staff goes through. So  
13 it's been a good year for me so far, and I really appreciate it.

14 I'd like to talk today about two activities that are very  
15 important to the future of the nuclear industry. Part 53, as you know, is very  
16 broad. I'm going to focus today on operator staffing portion of that. And  
17 then first I'd like to discuss, though, a new revision to the Part 50, 50.160,  
18 which is emergency preparedness for the small modular reactors and other  
19 new technologies. Next slide, please.

20 In the 50.160 rulemaking, the staff worked through some  
21 very difficult concepts and numerous comments. There was no shortage of  
22 comments both in support and in opposition of some of the aspects of the  
23 Rule. The volume alone, well over 2,000 comments, was impressive to  
24 have both the public engagement and the staff being able to respond to that

1 many.

2 One thing that we looked at very carefully was connectivity  
3 with other parts of the rulemaking going on, and guidance and everything  
4 else that's happening in the new reactor world. We want to make sure that  
5 this revision of, in 50.160 did have connectivity with Part 53 and what  
6 Member Bier just talked about in Part 52 and 50, along with some of the  
7 source term activities that Dr. Petti will be talking about here in a little bit.

8 Our review focused on four major categories. One was  
9 the EPZ boundary selection and offsite planning and response. And I'll  
10 speak in a little bit more detail on that. Hazards from non-nuclear and  
11 co-located facilities, mainly because of the presumed uses of the new  
12 technology, may be not just megawatt electric. It could be other processes,  
13 chemical processes, as well. We looked at the performance based  
14 regulatory oversight of the emergency response function. Important  
15 because thankfully, we don't have to exercise in real time these emergency  
16 plans very often. So the readiness of those are very important to us, and to  
17 make sure that readiness. So that oversight's important. And then the  
18 event selection for sizing the EPZ. It being a key result of the new rule  
19 language, and a very important topic, and it's been talked about quite a bit.  
20 Next slide, please.

21 Relative to the hazards from non-nuclear and co-located  
22 facilities, we want to look at and ensure that the impact of non-nuclear  
23 hazards, which may be more significant than the radiological hazard to the  
24 public, did not conflict with the radiological responses that may have to

1 occur.

2                   It is presumed that the smaller reactors may be an integral  
3 part of that, some other process to develop products used in manufacturing  
4 or chemical production, and this potentially, well, the heat energy, heat or  
5 energy may be used for production of other things. We want to make sure  
6 that the response to those hazards are appropriate and not conflicting.

7                   It's very important that we understand those non-nuclear  
8 hazards as well, so that if you have to respond to a non-nuclear hazard, for  
9 example, if you have to reduce or eliminate power to a certain portion of a  
10 chemical plant to shut down a system, you want to make sure that doesn't  
11 affect the response that you may have to have in a reactor incident. Or  
12 even cause reactor transient. So that's very important to understand those.

13                   Now FEMA has jurisdiction over the non-nuclear hazard  
14 portion of the response in their all hazards planning process. And, again,  
15 we'll talk a little bit more about this in a minute. In the inspection area, we  
16 probed the performance-based regulation oversight of the emergency  
17 response function. There is some high-level criteria, but there are no  
18 prescribed performance measures. And each applicant is to propose their  
19 idea of what measures would indicate the readiness of their plan and  
20 performance of their plan.

21                   This, of course, will bring with it some regulatory  
22 uncertainty, unpredictability, with each new application if they're going to  
23 come up with their own scheme. However, over time I believe precedence  
24 will take over and we will see some convergence of the performance



1 measures for these emergency plans as the staff and applicants continue to  
2 work through what the new technology would be, would look like in a  
3 performance measure perspective. This is an example of a tradeoff  
4 between flexibility and predictability. There's going to be push and pull on  
5 those two items throughout these new rules, especially when you're trying to  
6 be technology inclusive. So this was one of those examples.

7           The framework for inspections at the regional level is being  
8 developed, and we'll take a look at that when it comes down to time to do  
9 that. Now, the event selection for sizing the EP is a key attribute to this rule.

10 Being able to define the size of the plume exposure EPZ requires the  
11 important task of selecting the events and providing the source term for  
12 those events to input into the process for determining the size. In 2018, we  
13 commented that the determination of source term was one of the most  
14 important aspects of implementing this new rule. In response, the staff  
15 added Appendix B to the Reg Guide 1.242. In parallel with this, the  
16 Licensing Modernization Project is being developed, along with research on  
17 source terms. These activities, we recently received an important briefing  
18 from the staff regarding the source term efforts. And a lot of work has been  
19 going on in this area, and, again, Dr. Petti will talk about some of that.  
20 There needs to be continuing work on connecting this source term  
21 development activities and event selection with ultimately sizing the EPZ.  
22 So we acknowledge that it is an issue that's still ongoing in discussion, and  
23 that some applicants are working through the process. And, again,  
24 precedence and as we get through this and learn more about how the size of

1 the EPZ can be determined using source term and event selection, and  
2 licensing modernization, and all these different things that's going on, we will  
3 converge, I believe, on a very good process. Next slide, please.

4 The risk-informed plume exposure EPZ was generally  
5 supported by the Committee. We, as well the public and industry, support  
6 the concept that having the smallest EPZ that is required by the technology  
7 risk. Keeping the EPZ within the site boundary has many benefits in  
8 protecting the health and safety of the public. Notwithstanding the fact that  
9 it is decreased the amount of work you have to do to have evacuations and  
10 sheltering, and other portions of the offsite plan.

11 However, the associated offsite planning is commensurate  
12 with the reduced hazardous small reactors. For the smaller EPZs, no  
13 evacuation is required. No sheltering would be required. No alert  
14 notification system necessarily would be required. So there's a lot of  
15 savings and resource redirect to more risk important activities that can take  
16 place.

17 Also in this rule, the ingestion pathway EPZ changes to an  
18 ad hoc response because of the timing required, and the increased and  
19 better infrastructure that the U.S. has in interdicting problems in the food  
20 chain. The smaller reactors with lower source terms will be able to leverage  
21 those resources that are already out there. And being able to respond to  
22 ingestion problems.

23 The rule does require development of some local and  
24 federal capabilities to exist, to activate if needs arise. So there is some

1 planning that goes on, but essentially it's ad hoc. One of the most  
2 prominent results of the new rule is this plume exposure EPZ to be within the  
3 site boundary. And there's been a lot of discussion going on about that.

4 Our main issue with the smaller EPZ is that FEMA is  
5 excluded during the application phase, so from the review of radiological  
6 emergency planning. FEMA commented they were not in favor of being  
7 excluded. And after considering the consultancy with FEMA on offsite  
8 radiological planning, we are also not in favor of excluding FEMA from the  
9 review. I want to be clear though, and I'll probably say this a couple times.  
10 It's not the sizing of the EPZ that we think FEMA needs to be involved with.  
11 It's oversight of the offsite radiological and non-radiological preparedness.

12 The staff responded that the all-hazard planning process is  
13 sufficient for commercial nuclear plant radiological planning. The broad  
14 spectrum of potential new technologies, the types of commercial nuclear  
15 facilities, and the extent of offsite planning required, regardless of the EPZ  
16 size, brought us to the conclusion that FEMA should not be excluded. The  
17 longstanding partnership of FEMA to ensure the readiness of the offsite  
18 resources to respond to radiological hazards at a -- and I'm going to  
19 emphasize commercial nuclear facility, has been well developed through the  
20 FEMA regional structure. Federal response committees and other  
21 committees which contain the resources that would respond to all  
22 radiological incidents that -- where assistance is required.

23 I wanted to illustrate this on the next slide. On the  
24 left-hand side, I think that's your right-hand side, the onsite and offsite

1 planning activities. The requirement is for two FEMA reviews right now.  
2 One, early in the application phase for site characteristics and the  
3 impediments. And the second one is the emergency plan for offsite action  
4 adequacy and readiness. So on one side you see the onsite and offsite  
5 planning activities required, that the NRC reviews. And then on the other  
6 side is the offsite planning activities that take place, that FEMA reviews.  
7 And of course the NRC will review those as well.

8                   So on the next slide, this is what's eliminated when the site  
9 EPZ is within the site boundary. Or the EPZ is within the site boundary.  
10 The whole side of FEMA review is no longer performed. The strikeouts are  
11 the only items that are truly eliminated. Everything else continues to have  
12 to be there. You still have to have your contacts, still have to have your  
13 communications; still have to have offsite facilities. Those projections are  
14 still required at some extent. Public information, reentry plans, and this  
15 doesn't mention the hospital, medical response, law enforcement response,  
16 fire department response. That's still required to go on. So FEMA did  
17 comment in their letters on the Clinch River Site ESP that the all-hazard  
18 planning process doesn't sufficiently address these in that all-hazards  
19 planning guide, CPG 101.

20                   So on the next slide just in summary, we felt overall the  
21 rule and guidance is well developed. Staff did a really good job of  
22 addressing many comments. The source term efforts are continuing, and  
23 that's important, and we're continuing to follow that. We will be looking at  
24 the inspection guidance down the road to ensure that, again, the connectivity

1 and the comprehensiveness to ensure that the performance measures is  
2 converging on a good infrastructure.

3 Our position is that FEMA should remain informed of new  
4 reactor siting and emergency plan requirements. There may be some room  
5 for how the review is conducted, what they have to give back to the NRC,  
6 with the information flow from the application to the FEMA, so that FEMA  
7 can work with the local and state and federal governments and the tribal  
8 governments. That should continue. We feel like that oversight is  
9 important, regardless of the size of the EPZ. So we look forward to  
10 continue our dialogue on the comments and recommendations with that.

11 Transitioning now to the Part 53 operator licensing  
12 requirements on the next slide. We looked at the Subpart F. The rule has  
13 a good balance of flexibility and predictability. The staff should be  
14 commended for being able to work through this. They took a very  
15 methodical approach, and they have a very high qualified staff to be doing it.  
16 The licensing process largely follows the Part 55 licensing for reactor and  
17 senior reactor operators. And they've done a good job of fitting it into the  
18 technology inclusive approach to it.

19 The staffing plan, which is a document that will be  
20 submitted, has a lot of value. We felt like the shift technical advisor was  
21 initially eliminated from that. We didn't feel like the blanket elimination was  
22 appropriate. However, like we did in the NuScale, if there is a performance  
23 based justification through analysis and human factors engineering showing  
24 that the technical expertise exists on site or is not needed, then we would

1 agree with that. And the staff agreed with that later on with us, and  
2 indicated that they would be putting in that requirement to have an STA or  
3 that experience unless it's otherwise justified, rather than the other way  
4 around where it was just blanket eliminate.

5                   We also felt like it was important to have a single  
6 management position that had a singular reactor operator license who was  
7 overall the reactor operator licenses. Having served in that position at the  
8 Crystal River Plant, it proved to be very beneficial in several areas. One is  
9 to corral the different SRO opinions and thoughts and approaches to nuclear  
10 safety into one cohesive voice of senior reactor operators.

11                   The other one was to take the conflict of interest of  
12 schedule versus productivity or production off of the safety decisions from  
13 that on-shift shift manager. So it was a very, very beneficial to have the one  
14 SRO who is accountable for that in the operations staff.

15                   We also felt like the scope of the simulators was an  
16 interesting and good approach. The rule allows for limited scope simulators  
17 for limited activities where it's justified. And we felt like that's a good use of  
18 resources. And then we did note that there is some guidance documents  
19 that are dated and need updating. And the staff agree with that and are  
20 working towards that. Next slide, please.

21                   One of the most innovative concepts in the Rule was to --  
22 in the development of a new classification of operators called the certified  
23 operator. It is anticipated that there may be some technologies where  
24 human interaction or human action is not necessary response for a licensing

1 basis events. In these cases, the human operator takes a very low  
2 significance in an actual accident response.

3 So the criteria to be able to implement this portion of the  
4 rule was that the certain technology would be straightforward, passive, or  
5 otherwise void of the need for human thinking, verification, or action, and the  
6 operator action would not be required to maintain safety of the plant.

7 Licensees essentially license and certify their own  
8 operators. The certification process is initially approved by the NRC during  
9 the application phase. It largely follows the NRC licensing process.  
10 There's not a lot of differences. It feels like there's some flexibility provided.  
11 Certified operators perform all the functions that a licensed operator would  
12 do, including the administrative and tech spec, operability decisions, and  
13 other things. And one aspect, to be very clear, is that they're not co-located  
14 on a site. It's either a certified operator site or it's a licensed operator site.  
15 They're not together. Next slide, please.

16 We did not agree with this concept. Some of us on the  
17 Committee have been licensed by the NRC, and we felt like that sole  
18 licensing authority of the NRC has proven to be highly effective. And,  
19 frankly, it's a high bar to reach to get a federal license. And you feel it when  
20 you go through training. You feel the importance of it.

21 So the importance of that federal license, it's just a big deal  
22 because typically a senior regional manager, sometimes even the Regional  
23 Administrator will come out and charge you with the safety. Charge you  
24 with your duties and hand you your license and say now you go do it. And

1 it's a big deal.

2 It also removes the potential, having a license removes the  
3 potential conflict of interest of the safety decisions where a certified operator,  
4 certified by the owner or commercial plant owner, may have conflicting  
5 business objectives for the operation of the facility. The limited operating  
6 experience in the new technologies, where all the different operating  
7 scenarios and transient conditions may or may not be anticipated. Sort of  
8 the unknown unknowns piece of this equation.

9 So to say that an operator action or inaction may or may  
10 not be needed is a little bit, especially for first of a kind, maybe somewhat a  
11 prediction if you allow it. The current operating license process, we think  
12 can recognize the relevant and inherent passive features of the plants. You  
13 can reduce the amount of training time or focus it on where you need to have  
14 it. You can change your examination focus, your knowledge and abilities  
15 catalog can be changed. And you can reduce the time spent on  
16 non-significant features. So we think that the present licensing process  
17 could be graded to save whatever -- or have a benefit to the training  
18 process. But we feel like the benefit of having that federal license was very  
19 important.

20 So in summary, in all the Part 53 operations portions  
21 provides a reasonable performance based technology inclusive framework  
22 for operator staffing. The licensed operators would be essentially  
23 equivalent to the Part 55 that we have now. The submitted staffing plan is  
24 good and will provide a confidence of the comprehensive and well thought



1 out operating strategies for this new technologies, especially when more  
2 description up front is better than for the new stuff that we don't really have a  
3 good feel for the total amount of operator burden that's going to be on them.

4 The STA position should be required unless elimination is  
5 justified. And then certified operator programs shouldn't be pursued. We  
6 really feel like we should focus on fine tuning the graded approach to the  
7 licensing process, rather than to come up with a new licensing path or  
8 certification path.

9 So that concludes my remarks. I'll turn the presentation  
10 over to Dr. Petti for source term.

11 DR. PETTI: Thank you Greg. So let me talk a little bit  
12 about non-LWR source term activities. Next slide, please.

13 So before we begin, source term is used in different ways  
14 in the regulatory parlance in different places. I, when I think of it, have the  
15 broadest definition. It's the release of the radioactive or chemical species  
16 during postulated accidents from the fuel through any barriers in the facility,  
17 and ultimately to the environment.

18 So there are basically four major activities we focused on  
19 in source term since we last talked to you. There were two NUREGS on  
20 fuel qualification. Qualification of solid fuel systems and qualification of fuel  
21 dissolved in the salt, in the coolant, molten salt systems, particularly. And  
22 we'll talk a little bit about that. We reviewed the mechanistic source term  
23 topical approach from Kairos, which is the first non-LWR coming through the  
24 system. And, finally, integration of source term activities for advanced

1     reactors. This is in the context of Part 53. Next slide, please.

2                     So in NUREG-2246, it was report on fuel qualification for  
3     advanced reactors. We really liked the logical approach the staff took. The  
4     fuel qualification was top down, methodical, provide some assurance of the  
5     completeness when a claim is made that a fuel is, quote, qualified. And  
6     qualified is used in so many places, and so many different meanings for the  
7     staff to be on record. I think that was really important.

8                     The document had really broad requirements from  
9     everything from fuel fabrication and radiation performance and safety  
10    performance. The key parts of the approach that struck the Committee  
11    was, A, the need for data, experimental data. What data do you really  
12    need? And making sure that the data can help you assess the safety  
13    margin. How far are you from when the fuel will begin to degrade or not  
14    perform as you anticipated?

15                    As part of the NUREG document, both documents also  
16    discuss the need for source term data. This is the right place in our opinion.  
17    The fuel guys own the source term because that's where the fission  
18    products start, right? They're generated in the fuel. And so it made sense to  
19    have that in there. So it was nice to see both of those documents have that.

20                    The next slide talks about fuel qualification for molten salt  
21    reactors. You know, in the current structure, fuel behavior is really  
22    important in the safety case. But for these molten salt fueled concepts, the  
23    fuel is dissolved in the salt coolant and circulates around. It's a different  
24    configuration, and really required a new thinking of what does it mean to

1 have fuel qualification when it's not a solid fuel.

2 The report discusses volatility of fission products in the  
3 salt, which is really the key input to the source term. Volatization is the  
4 process by which the fission products are liberated from the salt and is the  
5 key input into the safety analysis.

6 The report also identified challenges to any barriers to  
7 prevent fission product release. In many of these molten salt systems, it's a  
8 series of barriers, the functional containment concept. And there's really  
9 some very nice work done by the contractor here at Oak Ridge. The salt is  
10 corrosive and it's just hot thermally. So insulation could be degraded if you  
11 have the wrong insulation. Instrumentation could be damaged if it spilled  
12 and you've got the wires in the wrong place. If you don't cover your  
13 concrete, you're going to have problems. So there were all sorts of like  
14 practical things that I thought were very helpful for the design community.

15 Also you had -- Oak Ridge had this challenge. We're  
16 talking about a number of different molten salts. Thermal systems, fast  
17 systems, the chemistry is different. They did a very good job at trying to hit  
18 the right balance there, that can be quite difficult given the breadth. And so  
19 we did find that the report provided a very reasonable and practical approach  
20 to developing a licensing basis for, for fuel qualification. Next slide, please.

21 So in terms of Kairos, to remind everybody the KP-FHR  
22 and the smaller version, Hermes, are molten salt cooled pebble bed reactor.  
23 The salt is Flibe, which is a eutectic mixture of beryllium fluoride and lithium  
24 fluoride. Why we're so interested, and this is the first real implementation of

1 a functional containment. We've already told them in our initial interactions,  
2 we're going to be interested in this. We think the public, there will be a lot of  
3 interest, and so you'll see us writing a letter on this to give them a heads up.

4 The TRISO fuel that's in the pebbles and the molten salt  
5 coolant together, both are very strong inherent barriers. So it's going to be  
6 very safe. The numbers are going to come out, the source terms are going  
7 to be very, very low. And we think that that's something that, you know,  
8 should really be discussed and almost applauded, right.

9 They had a very nice methodology to calculate the source  
10 term of fission products, activation products, and corrosion products. The  
11 key activation product here is tritium from the lithium absorption, and  
12 managing that is the real challenge because it's a high temperature system  
13 and tritium moves everywhere. We also found the approach consistent with  
14 the existing high level regulatory guidance on source term. Next slide,  
15 please.

16 Our comment was that the staff when they review an  
17 application that employs the methodology will need to ensure that  
18 experimental limitations related to tritium behavior in the Flibe salt and  
19 what's called diffusion and trapping effects in the graphite are adequately  
20 considered in the conservative safety analyses or sensitivity studies.  
21 There's a lot of uncertainty on how tritium behaves in these systems.  
22 There's a tremendous amount of literature largely from the fusion program.  
23 I actually did some of it myself. You have to make sure, and sometimes  
24 things aren't as obvious what's conservative and what's not. And just to be

1 really careful, there's competing effects, so that make sure they wring that all  
2 out and do it, do it well.

3               The other comment we had was that the staff SE didn't  
4 require experimental validation of the vaporization of the fission products  
5 from the Flibe, from heating. We felt that this was an important effect on the  
6 source term, and the experimental data would need it to confirm the  
7 approach used by the applicant. And we said we shouldn't issue the SE  
8 until you address this. They agreed with us, and updated their SE. I  
9 provided them vaporization experiments that need to be done are very  
10 simple. These are not difficult, doesn't have to be radioactive, just has to  
11 use Flibe. The Europeans and Japanese are doing this right now. Not with  
12 Flibe because of the difficulty of handling the beryllium, but other salts so  
13 that the methodologies are there. There's lots -- it's very easy to do these.  
14 And Kairos is going to be dealing with Flibe. We just asked that they do  
15 these sorts of experiments.

16               Next, turn to the source term in the context of Part 53.  
17 The staff gave us a whole day of presentations on everything on the source  
18 term, from source all the way out to the environment. Very, very well done.  
19 They've created a webpage for applicants where all the relevant information  
20 and links to the relative Reg Guides or documents that talk about source  
21 term are there. We thought that was very commendable, and it should keep  
22 the applicants up to date on the latest developments.

23               But we felt that it would be more helpful to have an  
24 overview section on their webpage, explaining how the applicant can use the

1 information in concert with their pre-application consultations, to just make  
2 them be better prepared for a high quality submittal.

3                   The other topic that we heard about and Chairman Rempe  
4 mentioned it earlier, were these computer calculations that were done in  
5 terms of developing the models and applying them for advanced reactors.  
6 They looked at four different reactor concepts: gas reactor, salt reactor,  
7 sodium-fast reactor, and a heat pipe reactor. And they did calculations from  
8 accident initiation through source term to test their models to learn, to figure  
9 out what was going on. And we felt that that was very valuable and  
10 although they're not design specific yet, these were open literature concepts  
11 that they could gather from the literature, they learned a lot. They could  
12 identify the key phenomena, what data gaps exist. How does the system  
13 respond? And what does that mean for source terms? And we do  
14 recommend that they document these even though these aren't formal  
15 designs, that there's some really good learning from a knowledge  
16 perspective that they should do.

17                   We also felt it was quite clear in talking to them that this  
18 has really helped increase the readiness of the staff to be ready for reviews  
19 of non-LWRs. So it was a really valuable exercise for them to do. It was a  
20 lot of effort. Next slide.

21                   We talked about in the context of source term, there are  
22 terms maximum hypothetical and maximum credible accidents. We have  
23 the same comment that Dr. Bier talked about in the 50/52 alignment. They  
24 are slightly different in that what they mean, but they also mean different

1 things to different folks. And that if they could help differentiate that, that  
2 would be really helpful we thought.

3 And finally we just reminded them that these reactors  
4 beyond the radioactive hazard, there are chemical hazards. The beryllium  
5 in the salt, a lead system, the lead fast reactor, lead is toxic. There's lots of  
6 things to be worried about even for worker safety, well, probably more than  
7 public safety. Next slide, please.

8 So in summary, the focus of the fuel qualification efforts by  
9 the staff has really been to ensure the fuel performs its safety functions in  
10 the context of a design. And the NUREG document does that. The source  
11 term aspects need to be considered as part of fuel. We completely agree.

12 And staff's effort to date of preparing for advanced reactor  
13 applications is commendable, and the activity should really help increase the  
14 readiness and promote expeditious reviews of current and future non-LWR  
15 applications.

16 Our comments in broad brush really were ensuring that the  
17 key components of the source term were identified, that all the key  
18 assumptions related to the source term are based upon experimental data or  
19 else conservative assumptions in the absence of data. And comments to  
20 improve technical completeness and clarity of the document, given the broad  
21 range of applicability across the advanced technologies and the associated  
22 designs.

23 So in closing, we're in good shape. We're in much better  
24 shape I think, that we all felt more comfortable after that day long

1 presentation we had with them. So, thank you.

2 DR. REMPE: Thank you, Dave. This concludes our  
3 prepared remarks and we'd now like to welcome your questions.

4 CHAIRMAN HANSON: Thank you, Dr. Rempe, and thank  
5 you all for your presentations. Let me just start off with a few things this  
6 morning. First of all, I wanted to make sure I thanked all the members of  
7 the Committee for your service to the Agency and to the country. It's deeply  
8 appreciated.

9 I know that many of you have had long careers, and this is  
10 -- this is something else that you're doing as part of your normal work. And  
11 the role that you play in advising the Agency is absolutely critical and very  
12 highly valued I know by myself and other members of the Commission, so  
13 thank you for that.

14 Also, we're very happy to support the effort to add new  
15 members to the ACRS, and I think where we share a commitment to provide  
16 the resources that are needed. Glad that the solicitation is now out and, out  
17 in the world. And also want to applaud the Committee really for making an  
18 effort to cast a wider net in terms of experiences and expertise to further  
19 bolster the capabilities of the Committee. I think that's just outstanding.

20 Also wanted to thank you for your review of the research,  
21 Office of Research. I read that carefully. I think having come from the  
22 DOE world, and seeing, you know, tens or hundreds or billions of dollars  
23 spent on applied research, I've always been extremely impressed with what  
24 the NRC can do with a modest \$65 to \$70 million research budget.



1 I also kind of share your, personally I share your support of  
2 the Future Focused Research. I think when Ray Furstenau first told me  
3 about it and I asked him how much was being spent on this, he said I think it  
4 was on the order of four or six hundred thousand dollars. And I was  
5 shocked. I thought for sure he was missing several zeros on the back end  
6 of that. Because I think it is really a great way for the Agency to look  
7 forward. And I think Ray and Stephanie and the rest of the team over there  
8 are doing a great job with, with relative to other parts of the government, as a  
9 pretty modest investment by the Agency. So thank you all for your  
10 continued look at that and your support for that.

11 I'm very interested in this idea about data, and the need for  
12 data, and I was glad that it was emphasized in the RES letter. But of  
13 course, Dr. Petti, you brought it up as well when it came to source term. But  
14 there was something that came up I wanted to, Dr. Rempe, I wanted to ask  
15 you. It said in the RES letter, you said the Committee continues to be  
16 concerned about the need for data to validate models, to characterize the  
17 responsive designs proposed or anticipated in near-term submittals for high  
18 burnup fuel, and new materials are incorporated into some ATF concepts.  
19 And I know this is also kind of related to the fuel fragmentation relocation  
20 and disbursal issue, as well. Can you offer some thoughts, either you or Dr.  
21 Petti, about the kind of data or how we should address the data gaps for  
22 FFRD and ATF fuel types?

23 DR. REMPE: Okay, so first of all, I want to thank you for  
24 your opening remarks. You know all of us feel that it's an honor and we

1 appreciate the opportunity to serve the Agency. And we believe it's  
2 important work. I also wanted to share my enthusiasm and support not only  
3 for the Future Focused Research Program, but also some of the  
4 agency-wide initiatives I mentioned, that we mentioned in our letter.

5 I think that is something that's been very important, so if I  
6 could just answer that before I answer your question, I would like to  
7 emphasize that a little bit more because it's the first time I've seen an  
8 agency-wide consideration of the code development and investments. And  
9 it's longer looking out into the future, which I also think's very important.  
10 And many of the members were very pleased to see that.

11 With respect to the accident-tolerant fuel materials and fuel  
12 testing, I think that's a bit of a harder issue because of, as well as the fuel  
13 fragmentation and relocation disbursement issue, because of the lack of, well, of  
14 the recent, now not so recent, but the closure of the Halden facility. And not  
15 only because we do have other test reactors. The advanced test reactor  
16 out in Idaho, and the BR2 over in Europe. But the way that they  
17 instrumented the tests is something that the world's trying to cope with.

18 And I believe Research is doing about all one can do at  
19 this time, with their FITUS (phonetic) international effort to try and use the  
20 international facilities. I think at the last meeting Dave mentioned it's too  
21 bad that we didn't react to this sooner, and I share that concern, too. We  
22 hadn't anticipated that Halden would shut down as soon as it did. But  
23 again, I think we're doing all that can be done to have that data. But it is  
24 something that I think the Committee feels is a continuing concern. Is there

1 anything that you'd like to add?

2 DR. PETTI: No, I think that's good.

3 CHAIRMAN HANSON: Given just the high level of  
4 demand, Dr. Petti, I mean you mentioned just with regard to the Kairos  
5 design, the need for confirmatory data in this case, on kind of tritium and  
6 vaporization in Flibe. It's not necessarily a radioactive test, but there again,  
7 there is a data need and I think that's a good example of some data needs  
8 across the advance reactor small modular reactor community about, that  
9 speak to some key concepts.

10 Do you have kind of, I wanted to give you an opportunity  
11 for ideas about how to kind of fill those data gaps that I think are going to be  
12 really important for our kinds of reviews, whether at universities or the  
13 national labs, or what?

14 DR. PETTI: I think there is capability at both universities  
15 and national labs for these experiments if a reactor developer doesn't have  
16 the capability themselves. DOE's been spending a lot of money on these  
17 technologies for a large number of years, so it's there. It's just, my personal  
18 perception is that some of the developers don't appreciate, for instance, how  
19 much data sits on light water reactor fuel, you know. I mean, there's just so  
20 much information, most of it is proprietary, I mean, we see them in topical  
21 reports so you can't really talk about that, but there's a lot of information that  
22 they gather to support their code development. And so, you know, fuel  
23 behavior historically is replete across all concepts, all technologies, of  
24 mistakes that were made that were not foreseen.

1                   Go back to the early light water reactor fuel days, there  
2 were all sorts of stuff that surprised them. You look at the sodium system,  
3 there were things that nobody knew, void swelling in the early days, you  
4 know. I can talk about TRISO fuel and problems that were found there,  
5 every single concept.

6                   We just, you know, it's not all about lack of imagination, I  
7 say it's not because of lack of imagination of engineers, these are  
8 complicated problems. When you talk about in-reactor performance, you've  
9 got to test to learn and get better, you know, I mean that's really the answer.

10                  And yeah, I worry about the radiation needs specifically  
11 because there are fewer, you know, available places. ATR's heavily  
12 committed, you know, they are opening up some new capability for water  
13 reactor to kind of replace the Halden capability, but not in volume, you know,  
14 Halden had lots of locations, they'll be able to have a capability but it won't  
15 be the same volume.

16                  CHAIRMAN HANSON: Okay. Thank you. Member  
17 Bier, I actually have a question for you. I welcome this effort by the staff to  
18 learn from the long experience with Part 50 and the experience of Part 52,  
19 obviously the Agency had approved a number of COLs back in the 2010  
20 time frame, I think there were 10 of those at the time, and of course we're  
21 coming to the end of the Vogtle licensing process, too, so I think we've got a  
22 real window of opportunity here to take a look at how to better align those.

23                  But I think you touched on a really important question and  
24 that is, the definition of some of these words like credible and substantial, so

1 I just wanted to put it to you directly, ask you whether or not you had any  
2 ideas or how you might approach on how to define a word like credible or  
3 substantial, to bring some, as you suggest, maybe some needed regulatory  
4 clarity and certainty?

5 DR. BIER: Thank you. I have to say, I had not made an  
6 effort to put together such definitions yet, we could probably take a look at  
7 that, but the issue of what's credible in particular for a, has been a problem  
8 for the Agency and the industry for a very, very long time. Before we had  
9 PRA, when we had the concept of the maximum credible accident, people  
10 pointed out that it was neither maximum nor credible.

11 And so I think it is important and, you know, in some of  
12 those cases it may be necessary to actually just replace the terminology, I  
13 mean, for instance, in the safety goals we have actual quantitative metrics  
14 that we can look at. But, especially looking at new reactor designs with  
15 graded PRA approaches, we may not have those quantitative metrics to fall  
16 back on always, there may be more qualitative analyses. So I think that's  
17 something the Committee could probably look at but I don't have specific  
18 recommendations at this time, sorry.

19 CHAIRMAN HANSON: Oh, no, that's just fine, just  
20 thought I'd ask as long as we had you all here. So with that, thank you all  
21 very much, I'll hand it over to Commissioner Baran.

22 COMMISSIONER BARAN: Thanks. Well thank you for  
23 your presentations and all the hard work the Committee continues to do on  
24 numerous technical issues facing NRC. It's incredibly valuable for the

1 Agency, as the Chairman said. I'd like to start by asking about ACRS's  
2 biannual review of the research program, I'll direct these questions to you,  
3 Joy, since you presented on it, but whoever you want to respond to these.

4 Research is doing some important work related to  
5 harvesting material and components from decommissioning reactors to  
6 better understand the effects of aging, and the Committee recommended  
7 that the staff look into whether it's possible to use harvested material  
8 information to add a predictive modeling capability to aging management  
9 strategies. Can you talk a little bit about that recommendation, or someone  
10 on the Committee?

11 DR. REMPE: Sure. Actually I think I'm going to ask --  
12 when we do the biannual research review we actually have leads for each of  
13 the divisions, and in this case the lead was Member Matt Sunseri and so I'm  
14 going to let him lead off on that because that was something that he really  
15 championed.

16 COMMISSIONER BARAN: Do you want to use the  
17 podium there, Matt?

18 MR. SUNSERI: Thank you for the question. So I think  
19 what we were thinking about is, you know, obviously harvesting material  
20 from these plants is a very difficult and expensive initiative. And it's usually  
21 backwards looking, you know, proving that the empirical trends that we had  
22 established are, you know, bearing out in the field.

23 So one of our members brought up the fact, well, can we  
24 use maybe harvesting data to combine that with some of the more

1 sophisticated models that we're doing, artificial intelligence, twinning, or  
2 whatever, to turn this into a more predictive thing, especially as we go for a  
3 longer life plant designs and, you know, materials that we may not be  
4 completely familiar with. Does that help?

5 COMMISSIONER BARAN: Yeah, very much so.  
6 Thanks, appreciate it. And I know ACRS has been following the staff's  
7 evaluation of high energy arcing faults, or HEAF, over the years, and the  
8 staff's research to date has indicated HEAF maybe pose a potentially higher  
9 risk than previously understood for some plants. Can someone share their  
10 thoughts on how the HEAF research has progressed and is progressing?

11 DR. REMPE: So I'll start but if Member Sunseri wishes to  
12 help afterwards he can add in more, but as you probably are aware it has  
13 been taken off the list for the pre-GSI area, and my understanding now is  
14 that the research is more focused on trying to better identify what areas of  
15 the plant will have the materials of concern. And, Matt, did you want to add  
16 more on that? Is it okay for him to -- he's speaking a bit --

17 COMMISSIONER BARAN: Sure.

18 DR. REMPE: He indicated off the mic that he thought that  
19 was an adequate -- does that answer your question?

20 COMMISSIONER BARAN: Yeah. And is that something  
21 you all are going to keep an eye on as it goes forward?

22 DR. REMPE: Yes. There are several members who,  
23 and I believe it's on our list of topics we'd like be updated on, and the  
24 research staff's been very supportive of providing those updates.

1 COMMISSIONER BARAN: Great. Well, you know, Joy,  
2 you mentioned that the Committee recommends that its review of the  
3 research program be done every three years rather than every two, and  
4 given the maturity of the research program and the reasons you talked  
5 about, and it sounds like the staff support, I think that change probably  
6 makes sense. I just ask SECY maybe to include Committee approval of  
7 that change as an option on the draft SRM for the meeting for us to consider,  
8 because I think you do actually need Commission sign off on that, is that  
9 right?

10 DR. REMPE: That's why I brought it up in my  
11 presentation, so I'm glad that you asked, or made that comment, is that I  
12 think that it's something that would helpful if we did have Commission  
13 support for that change.

14 COMMISSIONER BARAN: Okay. We'll get real  
15 procedural there for a minute. Okay, great. Well, I appreciate the  
16 committee's review of the draft proposed rule to align the safety  
17 requirements of Part 50 and 52. Vicki, you mentioned that the staff is  
18 contemplating reducing some Part 52 reporting requirements and that the  
19 Committee had a concern about that, at least for first-of-a-kind designs.  
20 Can you just take a minute and talk a little bit more about that? You know,  
21 what the specific reporting requirements are and how you see evolutionary  
22 designs versus first-of-a-kind being a relevant difference on those?

23 DR. BIER: I can take a first stab at it but there may be  
24 other committee members who're more informed on the details to respond.



1 My understanding is that currently for models of the ECCS, the emergency  
2 core cooling system, it's proposed that licensees be given the opportunity to  
3 update those models or even correct errors that are detected in those  
4 models without going back to the NRC for approval.

5 And, in the Committee's discussion it was observed that,  
6 for many of the existing applicants and vendors, and so forth, there's very  
7 expensive experience with that right now to be, you know, trusting of the  
8 licensees or vendors to make those opportunities on -- to make those  
9 updates on their own. And that, if you're talking about completely new  
10 system designs and possibly licensees or vendors that have not very much  
11 experience with the current regulatory process, that it may be more difficult  
12 to put that level of reliance on them without greater NRC oversight.

13 But if someone else from the Committee would like to add  
14 any details, I would be happy to have that. Thank you.

15 DR. REMPE: Thank you. If it's acceptable I would add  
16 one comment to that, when we questioned the staff about this, they pointed  
17 out that with the reports, reporting requirements could be reduced because  
18 they've seen very minor changes that have had to been reported and they  
19 thought that it was an unnecessary reporting requirement. But our concern,  
20 as Member Bier carefully outlined, was that the established vendors of  
21 evolutionary designs may have more experience with their models, whereas  
22 with these new innovated models and less operating experience, there may  
23 be some substantial differences in the mods. Thank you.

24 COMMISSIONER BARAN: Thank you very much. Part

1 53, Advanced Reactor rulemaking, obviously a major priority for the Agency,  
2 so thank you for all your work on that effort. Greg, I had actually some  
3 questions here to talk a little bit about the blanket elimination of a Shift  
4 Technical Advisor position and your thoughts on that, and this non-licensed  
5 certified operator approach, but you did a great job kind of covering all that.  
6 So I don't know that I really have anything to ask about that but I just wanted  
7 to flag, I thought that discussion was really helpful and I appreciate it.

8 Digital instrumentation and control has been a  
9 long-running focus area for NRC, and I think a lot of progress has been  
10 made on that recently, staff is working on a proposed expansion of the 1993  
11 policy on defense against common cause failures in digital I&C systems.  
12 And the staff plans to send a policy paper to the Commission this summer,  
13 and it sounds like you all, ACRS, aren't planning to do a letter report on that  
14 matter so I thought I'd just give you all a chance to share any thoughts you  
15 might have about it.

16 DR. REMPE: So we did have a meeting about this a  
17 couple of weeks ago during our subcommittee meeting, unfortunately all we  
18 received was an outline for that SECY. And so that was an example of  
19 where members decided that it was better to simply document our interim  
20 thoughts in a memo and that's included in our meeting summary report. We  
21 did include in that, those paragraphs, that we would like to see the actual  
22 text before, when it's finalized. But, again, having a draft outline and some  
23 slides, it was a little more difficult to, or we did not think it was worthwhile to  
24 write a letter at this time.

1 COMMISSIONER BARAN: Okay. Well that --

2 MR. BROWN: Could I make a comment?

3 COMMISSIONER BARAN: Charlie, you want to?

4 DR. REMPE: You need to go to the microphone. Is it  
5 acceptable to --

6 (Simultaneous speaking.)

7 COMMISSIONER BARAN: Sure, this is Member Charlie  
8 Brown coming to the microphone.

9 MR. BROWN: There were two pieces to this, one was we  
10 got notified they were preparing a SECY to send to you all on updating the  
11 CCF criteria which would fundamentally involve Branch Technical Position  
12 7-19, and we did just get an outline, in terms of on the written paper.

13 The presentation they made also played a part in how we  
14 decided to respond to that. We had a subcommittee meeting on it, and if  
15 you looked at the way they walked through a parallel path for maintaining the  
16 existing methodology for folks, applicants to use, or use a risk-informed path.  
17 And so the two paths go down, there was a little bit of merging and then it  
18 branches out and -- so the presentation provided a good outline of what their  
19 thoughts were. My initial reason for asking for a presentation was to ensure  
20 we weren't going to loop (phonetic).

21 Branch Technical Position 7-19 is very good, it's been  
22 updated, it's now on revision eight. We've still got an issue or two with it,  
23 we've been finding out, which you're probably well aware of after we sent a  
24 letter to the Commission. But it in fact, from 19 -- when I came on the

1 committee in 2008 there have been several revisions, we've approved those,  
2 it's been improved and I think it's actually in a good place now for the general  
3 defense in depth operation, and I do not think it's cumbersome in spite of  
4 what some people may claim.

5                   So my decision, or my recommendation to the Committee  
6 was to not write a letter on this because it was kind of sparse, was what we  
7 would say, and the fact that they were not eliminating the use of BTP 7-19 in  
8 its present form. The one thing we asked for, gave them comments on in  
9 the meeting was ensure that you don't co-mingle the risk in the first part so  
10 that you don't have to jump between sections, provide an alternative review  
11 process which utilizes that, which keeps parts of 17 but introduces the other  
12 parts.

13                   It's similar to what we did for ISG-06, which was a  
14 pre-licensing review thing, back in the early, like, 2010, 2009 time frame that  
15 we went through where we've identified the importance of architectures  
16 relative to the general review and design of the digital I&C reactor trip  
17 safeguards and other safety systems.

18                   If you don't have an architecture which meets the  
19 fundamentals, and everybody's heard this before, of redundancy  
20 independence, deterministic processing, which means it goes straight  
21 through, doesn't stop and go to something else, the software doesn't.  
22 Diversity in defense in depth which is the fourth element, and the last  
23 element which is control of access, which is different for digital systems than  
24 it was for analog systems.

1                   So there, subsequent to the initial version of ISG-06, they  
2   came back later, we approved another design where they applied an  
3   alternate review path, which provided other options but still included the  
4   architecture as a framework. So the two paths is a good way to do it and  
5   that's why I suggested, since we didn't have a lot of detail, we ought to wait.

6                   We did not request to see the SECY before it went to you  
7   because I think it's general enough and they were, good explanation. I think  
8   we're going to see it probably but then we're going to have another  
9   subcommittee on it subsequently if and when they start doing the BTP 7-19  
10   modifications. Sorry to take so much time but I --

11                  COMMISSIONER BARAN: No, thank you very much,  
12   that's very helpful. Thank you, Chairman.

13                  CHAIRMAN HANSON: Thanks, Commissioner Baran.  
14   Commissioner Wright?

15                  COMMISSIONER WRIGHT: Thank you, Mr. Chairman.  
16   And before I start the questions, while they're working on a definition or  
17   clarifying definitions for credible and substantial, maybe throw reasonable  
18   assurance at them as well.

19                  (Laughter.)

20                  CHAIRMAN HANSON: Why not? As Rumsfeld said, if  
21   you can't solve the problem, expand the problem.

22                  COMMISSIONER WRIGHT: Expand the problem, yeah.  
23   But good morning again, and thank you for your presentations today and, as  
24   the Chair said earlier, also for your service to the country and as you work

1 with us. And Chairman Rempe, thank you for your leadership and it's about  
2 time that glass ceiling was broken, becoming the first female Chair,  
3 congratulations on that as well.

4 I think we all agree that there's a lot of great work being  
5 done in the Office of Research, some of which has been covered today.  
6 And as you know, our budget is small, it's not unlimited, right? So I wanted  
7 to get your perspective and whether there are any resources, either staffing  
8 or funding that you see as being critical to any research initiative. For  
9 example, are there any areas where you think additional funds would lead to  
10 a more efficient and effective review? And if any of the other panel  
11 members would like to comment, you know, feel free on this, too.

12 DR. REMPE: I'll start off, that's one of the questions we  
13 actually asked in our review, are there areas where you feel like they don't  
14 have adequate resources and we've not ever had the staff come back and  
15 say, well there was something that we didn't get to do.

16 As you know, the user need request program, the  
17 requesting organization does provide that funding; it's these other activities  
18 right now that are, the future focused research and some of the integrated  
19 efforts that are maybe perhaps a little more, less clear on how the funding's  
20 provided. But I've not heard anyone from RES say, yeah, we really wanted  
21 to do this, too, and we couldn't. Do others who are the leads for the various  
22 division reports have any additional comments to make?

23 MR. HALNON: I'm not a lead, but I would make one  
24 comment that there is one area that we did probe, and that is the Research

1 staff takes care of the Reg Guides, and there's a tremendous amount of flux  
2 in rev. one, two, three, four, and sometimes they're being changed by  
3 different rules at the same time. They do a good job of keeping that  
4 together, but as we get more and more activity that's one area that we want  
5 to focus on to make sure that we're not unchanging something that's being  
6 changed somewhere else.

7 COMMISSIONER WRIGHT: Okay, thank you. And  
8 Chairman, you talked about the potential subcommittee restructuring, or  
9 reorganization I guess, so I have a couple of questions about that. Talk to  
10 me a little bit more about what it might look like, you know. I guess -- and  
11 maybe let me follow up, both, the staff and ACRS have expressed concerns  
12 about the resources expended, too, right? Are there any reorganization  
13 efforts that are aimed at addressing that issue?

14 DR. REMPE: First, if you'd like to look at our current  
15 organization chart it's actually posted on our website. We approved it I  
16 guess in our February full Committee meeting. One of the major changes  
17 was to make sure we were prepared for near term submittals from the  
18 various design developers, and so we've kind of reorganized how it's visually  
19 appearing. That there is an area related to design certifications and other  
20 regulatory activities, and then there's a second major grouping regarding  
21 technical areas of expertise. We combined some activities together to, and  
22 we will show -- for example, an accident analysis, that includes thermal  
23 hydraulics, severe accidents, and source terms, and it depicts it as one  
24 major category in identifying the Chairman. You will see the various design

1 centers that are listed there so it's more preparing for activities that are  
2 ongoing and anticipating the near term, and eliminating some  
3 subcommittees that just haven't met in recent years and we think that that's  
4 a closing out activity.

5                   With respect to resources, there were several I identified in  
6 one of my slides where we're trying to not only eliminate unnecessary letters  
7 and go with memos, or items listed in our summary report, we've reduced  
8 the amount of presentations required in several of our activities, so we are  
9 trying to be cognizant of eliminating unnecessary activities. Does that  
10 answer the question you had?

11                   COMMISSIONER WRIGHT: Yeah, I guess it's getting at I  
12 guess what I was kind of wanting to hear and I think you've kind of headed  
13 that direction, it sounds like the whole purpose is to try to help streamline the  
14 reviews?

15                   DR. REMPE: Right, make them more effective and focus  
16 on what's most important for safety risk cases.

17                   COMMISSIONER WRIGHT: Right. Thank you. Good,  
18 thank you so much for that. So recently I went to ARPA-E and it was the  
19 week after y'all had the digital twin presentation, okay, and you mentioned  
20 that earlier, and that leads to a question that I have that actually was brought  
21 up during my meeting with them, out there at DOE.

22                   So you've got solicitations for new members, right? And  
23 some of them are focused on more generalists, right? Has the Committee  
24 considered any applicants that may have expertise in certain areas, for



1 example, digital technology, but might be in a different industrial environment  
2 outside of the nuclear arena? That was something that was expressed that  
3 might be a need for you.

4 DR. REMPE: So as you -- no, our solicitation is focused  
5 on generalists because we realize, or we're looking forward at the workload  
6 that's coming downstream and we want to make sure that we have someone  
7 who's got a broad background that can help us in more than one area. And  
8 that's actually one of the reasons I particularly like my ACRS activities is  
9 that, maybe I have experience in one or two areas but I've grown over the  
10 years to learn other things.

11 We have over the years had individuals who perhaps don't  
12 have a nuclear engineering degree but have other areas of expertise. In  
13 some cases, however, we also hire consultants, as you know, for when we  
14 have a specialized need. For right now we've recently hired a consultant to  
15 help us with one of our design-centered reviews because of the unique  
16 nature of that design.

17 So that's another avenue that might be pursued but of  
18 course the members have to be able to either, have knowledge in various  
19 areas as well as come up to speed, so we haven't looked at the resumes  
20 yet, our solicitation's open until July 8, and we'll see what comes in. But  
21 that will be something that we'll be emphasizing, as according to the text,  
22 that we do need to have someone who's got a broad range of expertise that  
23 is needed.

24 COMMISSIONER WRIGHT: Okay, thank you for that.

1 Great, good to see you. So let's talk a little bit about the risk-informed  
2 approach to EPZs a little bit, because it makes sense to me. My  
3 understand is that the staff's approach is consistent with research and test  
4 reactors, right, which have similar hazard profiles. Under that framework an  
5 onsite response organization still required to coordinate with local officials  
6 and not just under FEMA's purview, right? And given the NRC typically has  
7 oversight and expertise of planning activities within the site boundary, am I  
8 kind of getting that right or am I missing something?

9 MR. HALNON: Yeah, that's exactly right. I would submit  
10 though, that they have the lower hazards but they don't, the new reactors  
11 don't have the same risk as the RTRs might. For example, the RTR might  
12 not operate 24/7 in trying to make a profit like a commercial reactor might.

13 COMMISSIONER WRIGHT: Right.

14 MR. HALNON: In addition to that, the new technologies  
15 being affected outside of a university or a lab perspective, you have the local  
16 government who is still responsible for the health and safety of the public,  
17 whether it be something as tritium that we've seen in the past or other  
18 problems.

19 So we feel like the flow of information from an application  
20 to FEMA so that FEMA can be an informed area to help the locals develop  
21 their radiological annex to their all-hazards plan is important, rather than  
22 having the information go the other way, which is the local folks knowing  
23 more about it than FEMA and therefore --

24 COMMISSIONER WRIGHT: And I'm going to quickly ask,

1 kind of combine two questions here. So you noted on one of your slides  
2 that source term efforts are a continuing topic for future meetings, so one  
3 question, is there an area or areas in particular that require additional dialog  
4 to resolve in that particular area? And then another question, are there any  
5 particular areas where you think the ACRS and the staff won't ultimately  
6 align, and if so what are your thoughts on not reaching resolution in those  
7 areas?

8 MR. HALNON: In the source term area, we feel that the  
9 research going on and the methodology of developing the source terms is in  
10 good place, the issue is the event selection and then how did that feed into  
11 the equation of your size of the EPZ. And that piece of it, and it's mainly the  
12 event selection, is the most probably contentious part. We don't think that  
13 there's necessarily a distinct answer yet. NuScale's working right now with  
14 the staff on developing their event selection, and the Licensing  
15 Modernization Project has its way. Part 53 is working through and, at least  
16 in my personal opinion, I think it's converging on a consensus at some point  
17 down the road.

18 But there's so many different events that can occur and  
19 then you add in the new technologies, what kind of events do you have to  
20 worry about? Especially if you have a chemical hazard, does that have to  
21 factor into the, you know, I would say source term, but non-radiological  
22 source term issues? So there's a lot that has to be learned as we go  
23 forward. To set a distinct answer right now may be actually detrimental in  
24 my mind, and may be shortsighted. So we need to let it work out, I think the

1 learnings that we're getting from the applicants are important to take a look  
2 at and maybe converge on a valid way of doing it.

3 COMMISSIONER WRIGHT: What about the alignment  
4 issue with staff?

5 MR. HALNON: I don't think we're misaligned with the staff  
6 on source term and event selection. I think that we all agree that there's  
7 different ways of looking at it and as we work through the Part 53  
8 discussions on license basis events, design basis accidents and events,  
9 non, you know, beyond the design basis, how it all fits in the -- and that was  
10 that connectivity I was mentioning with 50.160 to make sure that the  
11 discussions over here will compliment and not confuse the rule that we're  
12 trying to put in over here.

13 COMMISSIONER WRIGHT: Okay, thank you. Thank  
14 you, Chairman.

15 CHAIRMAN HANSON: Thank you, Commissioner Wright.  
16 All right, with that we come to the end of our time together. I wanted to  
17 take just two minutes and thank the Committee for one more thing and that's  
18 the engagement on the alkali silica reaction issue up at Seabrook, I know  
19 you all I think had your first meeting on that issue in May, if I'm -- or April -- if  
20 I'm not wrong. It's an issue of course that's of concern to the public  
21 surrounding the plant and we appreciate you guys engaging on that in a way  
22 that augments I think the really good work that NRC staff, our regional  
23 inspectors, and our resident inspectors have done on that work as well, so  
24 thank you. With that, thanks to my colleagues for your comments and

1 thoughts today. And thank you all again. We're adjourned.

2 (Whereupon, the above-entitled matter went off the record

3 at 11:28 a.m.)