

UNITED STATES

NUCLEAR REGULATORY COMMISSION

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PUBLIC MEETING WITH THE ADVISORY COMMITTEE ON REACTOR

SAFEGUARDS

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FRIDAY,

DECEMBER 4, 2020

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The Commission met in the Commissioners' Hearing Room at the Nuclear Regulatory Commission, One White Flint North, 11555 Rockville Pike, at 10:00 a.m., Kristine L. Svinicki, Chairman, presiding.

COMMISSION MEMBERS:

KRISTINE L. SVINICKI, Chairman

JEFF BARAN, Commissioner

ANNIE CAPUTO, Commissioner

DAVID A. WRIGHT, Commissioner

CHRISTOPHER T. HANSON, Commissioner

ALSO PRESENT:

ANNETTE VIETTI-COOK, Secretary of the Commission

MARIAM ZOBLER, General Counsel

ACRS MEMBERS: (attending via video conference)

MATTHEW SUNSERI, Chair

JOY REMPE, Vice Chair

CHARLES BROWN

WALTER KIRCHNER

DENNIS BLEY

JOSE MARCH-LEUBA

RONALD BALLINGER

VESNA B. DIMITRIJEVIC

DAVID A. PETTI

PETER RICCARDELLA

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

2 10:01 a.m.

3 CHAIRMAN SVINICKI: And now I will open
4 and convene our meeting this morning of the Commission
5 with the Advisory Committee on Reactor Safeguards.
6 Gather at NRC are the members of the Commission,
7 representative of OGC and of the Office of the
8 Secretary.

9 All members of the ACRS will be
10 participating remotely in today's meeting. Again,
11 appreciate very much all members of the Commission for
12 the flexibility, we had to stay very adaptive through
13 out the course of the public health emergency. I'm
14 also gratefully that the members of the Advisory
15 Committee and Reactor Safeguards have made provisions
16 to participate in today's meeting. This is very
17 important engagement. I think of course the Commission
18 is in receipt of the letter reports of the ACRS
19 throughout the year on any number of important topics
20 mandated under the Atomic Energy Act and then other
21 matters that the Committee takes up in its own
22 discretion or just because they have been consistent
23 thorny technical issues that the agency have been
24 working through for a number of years like digital
25 instrumentation and control. So it is particularly

1 of great utility to members of the Commission to have
2 an opportunity to engage the ACRS to explore further
3 understanding of their consensus letter reports and
4 they are Committee that works by consensus but also
5 to have a chance to pursue topics if we should choose
6 outside of the current letter reports and issues the
7 Committee is working on.

8 So we will hear from Matthew Sunseri,
9 Chairman of the ACRS. We will hear from member
10 Kirchner. Also, from the Vice-Chairman, Joy Rempe and
11 from member Charles Brown.

12 I understand that other members of the ACRS
13 who traditionally in a physical meeting here would have
14 been at least available for questions, have two-way
15 communication for the purposes of today's meeting.
16 Although it's not very routine for other members of
17 the Committee to be called to answer questions. I just
18 want to make my colleagues aware that they stand in
19 that capacity ready to answer questions. So your
20 questions do not need to be limited to the members who
21 will be giving the formal presentations.

22 Before I start, would any member of the
23 Commission like to add anything?

24 Okay, hearing none, then I will begin by
25 turning over to the current Chairman of the ACRS, Matt

1 Sunseri. And I think the booth will help us pulling
2 him up. Oh, wonderful.

3 Okay, great, thank you. Please proceed

4 ACRS CHAIR SUNSERI: Good morning,
5 Chairman, good morning, Commissioners. I'm Matthew
6 Sunseri, Chairman of the Advisory Committee on Reactor
7 Safeguards.

8 It's a pleasure to be here with you today
9 to conduct this briefing. I know from previous
10 experiences that the members consider this to be a very
11 valuable experience, and we look forward to it and we
12 hope you do as well.

13 Slide 2 please. Our agenda is as follows.

14 I will be providing a general overview of activities
15 that we have completed since our last briefing with
16 you. Including our review of two subsequent license
17 renewals and an update on our transformation
18 activities.

19 Dr. Walt Kirchner, our Member-at-Large,
20 will be presenting a summary of our review of the NuScale
21 design certification application.

22 Dr. Joy Rempe, our Vice Chairman, will be
23 discussing our evaluation of NRC safety research
24 activities.

25 And lastly, Member Charles Brown will be

1 providing a report on a couple of digital
2 instrumentation and control activities that we have
3 reviewed.

4 Slide 3 please. Since our last briefing
5 with the Commission we have produced 29 letter reports.

6 Some of the more notable ones are our final report
7 on the safety aspects of the NuScale design
8 certification and standard design approval.

9 Walt Kirchner will be discussing this
10 report in more detail during his part. A couple of
11 reports on Agency research activities, as noted on this
12 slide. Joy Rempe will be providing more details during
13 her report.

14 Slide 4 please. We continue to review and
15 offer our advice on digital instrumentation and control
16 topics, as requested by Staff.

17 Charles Brown will be providing details
18 on two of these, one being implementation of 50.59
19 screening for I&C upgrades, and another on branch
20 technical position 7-19 regarding diversity and
21 defense-in-depth.

22 Recently we've been taking on some new
23 projects. We reviewed a few topical reports on the
24 Kairos, molten salt reactor.

25 Likewise, we have seen some topical reports

1 on the BWRX-300, a small modular reactor.

2 And although we haven't provided a written
3 report, we have begun to review the operating license
4 application for the SHINE medical isotope production
5 facility.

6 Finally, on this slide, we've completed
7 two subsequent license renewal applications.
8 Subsequent license renewal provides currently
9 operating plants the opportunity to operate for up to
10 80 years when they demonstrate they can safely mitigate
11 age related degradation at their plants. We expect
12 to see many more of these applications in the coming
13 years.

14 Slide 5 please. Now I want to briefly
15 cover two subsequent license renewal reviews that we
16 have completed, and set the stage for one of our
17 transformation topics that I will discuss in a moment.

18 Since our last briefing with you we
19 completed a review of the Peach Bottom application.
20 It was a straightforward review as the applicant had
21 demonstrated thorough technical details on their aging
22 management program, good maintenance of material
23 condition of the plant to date, effective consideration
24 of industry experience regarding aging, management and
25 compliance with regulations.

1 The Staff's safety evaluation was thorough
2 and complete. We issued our report in December of last
3 year noting that there were no license renewal issues
4 preventing the NRC from issuing licenses and that the
5 application should be approved.

6 Slide 6 please. Surry was our third
7 license, third subsequent license renewal review.
8 Similar to Peach Bottom, the applicant provided a
9 technically thorough application.

10 However, at some point between the time
11 when the application was submitted and when we took
12 up our review, the station experienced degradation of
13 a segment of their underground fire suppression system
14 piping. The applicant entered this issue into their
15 corrective action program and was dealing with the
16 situation as any other operating facility would be
17 doing.

18 This topic became a subject of a different
19 professional view, including both administrative
20 handling of the problem and technical differences with
21 the approach to resolve the issue.

22 We heard from two individuals that had
23 differing views from the majority of the Staff and
24 considered their input during our deliberations. It
25 was a healthy and professional exchange of information

1 and the Committee appreciated the individuals for
2 coming forward and sharing their views with us.

3 We issued our report in April of this year,
4 also noting that there were no open license renewal
5 issues preventing the NRC from issuing the license and
6 that the application should be approved.

7 Slide 7 please. Last topic for me to
8 discuss is an update of our transformation activities.

9 We've been keeping up with the Agency's actions through
10 multiple ways.

11 Earlier this year we met with the EDO's
12 office and learned about the direction the Staff was
13 moving. During this briefing we heard about four focus
14 areas and seven initiatives Staff is pursuing.

15 This is very helpful to us because we saw
16 a nexus with the committee in two areas. One being
17 risk-smart and the other process simplification.

18 Our Staff has also had frequent
19 interactions with NRR, and the details of some of their
20 process initiatives have crossed over into areas of
21 our review.

22 We also recognize the need to always be
23 looking for better ways to conduct our business and
24 continue to focus on safety as our guiding principle.

25 We're seeing some operational benefits

1 from our efforts. On a small scale we realize some
2 cost savings by scheduling more subcommittee work
3 during the same week as full committee meetings.

4 On a more significant level, work that our
5 previous chair had initiated to move us to greater use
6 of technology was timely and allowed us to response
7 to pandemic restrictions, hold meetings virtually and
8 meet all our pre-pandemic operational planed goals for
9 the year.

10 Finally, we continue to identify
11 opportunities during a recent retreat. We agreed to
12 consider use of virtual meetings for some of our
13 activities post-pandemic.

14 And one or more important, or more
15 significant ideas, relates to the experience we had
16 with the subsequent license renewal reviews. We'll
17 be trying out a reduction of some subcommittee
18 interactions based on the complexity of technical
19 issues. And instead take the review straight to full
20 committee for deliberation.

21 This has the advantage of reducing burden
22 on Staff and applicants while maintaining full
23 committee engagement. For example, activities such
24 as the subsequent license renewal of the Peach Bottom
25 could skip the subcommittee and come straight to full

1 committee while more complicated reviews, such as
2 Surry, would continue to have subcommittee and full
3 committee involvement.

4 This completes my part of the presentation.

5 I now call on Walt Kirchner for the NuScale review.

6 Slide 8 please.

7 ACRS MEMBER KIRCHNER: Thank you. Good
8 morning, Madam Chairman, and Commissioners. I'm Walt
9 Kirchner, Chair of the NuScale Subcommittee. And I'm
10 going to present the results of our NuScale design
11 certification application review.

12 Next slide, Number 9, please. On the left
13 you see the major design characteristics of the NuScale
14 power module, as submitted in their DCA.

15 I'm going to draw your attention to the
16 figure on the right. And highlight several unique
17 features of the NuScale design.

18 It's very highly integrated. It
19 illuminates large diameter piping outside the reactor
20 pressure vessel, which is enclosed in the
21 high-strengthened containment vessel. And that is
22 normally under a vacuum, under normal operations.

23 Almost to the effect of a thermos bottle.

24 It's immersed in a large pool of water.

25 The internal dimensions of volumes assure

1 that the core remains covered for a wide spectrum of
2 design basis events, including cool down transients
3 in AOO and small break LOCAs, which are design basis
4 accidents, ensuring that specified acceptable fuel
5 limits are not exceeded.

6 The tall riser, or chimney shroud in the
7 middle of the diagram, above the core, provides the
8 driving head for natural circulation. And then you
9 see two helical-coil steam generator bundles wrapped
10 around the riser in the downcomer section.

11 That's shown in red and blue in this figure.

12 And then the really unique features of this
13 design are two passive safety systems. One is the decay
14 heat removal system.

15 And about the middle of the diagram, in
16 green, you see the heat exchangers for the decay heat
17 removal system. And then there are passively actuated
18 ECCS valves. You see three at the top of the reactor
19 pressure vessel and then two recirculation valves, just
20 above the core elevation, at the bottom of the figure.

21 Both systems provide a diverse means
22 through boiling condensation to reject stored energy
23 and decay heat to the reactor building pool. And that
24 provides long coping times.

25 Slide Number 10 please. Now I turn to our

1 review of the DCA and the safety evaluation report.

2 After we met our Phase 3 milestone we
3 regrouped. And based on that review, identified
4 crosscutting safety focused areas for our next Phase
5 5 review.

6 Which we supplemented with in-depth
7 technical chapter reviews by Members. Particularly
8 focusing on how the Staff closed open items from the
9 earlier phase. These chapter reviews are then
10 presented to the Committee and approved by the Committee
11 as a whole.

12 We issued our final letter report before
13 the revised July 31st milestone. And our effort, in
14 summary, span about four years and including some 40
15 odd subcommittee and full committee meetings and over
16 two dozen letter reports on the topic. So, it was a
17 very comprehensive review.

18 Next slide please. Number 11. So in our
19 NuScale final letter report, in summary, we found that
20 there is reasonable assurance that the NuScale SMR can
21 be constructed and operated without undue risk to the
22 health and safety of the public.

23 We concluded that the Staff's SER and DC
24 and standard design approval, should be issued subject
25 to the Staff's exclusion regarding finality of design.

1 We identified potentially risk
2 significant, but solvable design items, to be reviewed
3 at the COL stage, and updated in the, in an update in
4 the PRA fuel load. I'll cover these items on the short
5 list on the slide in the remainder of my presentation.

6 Slide 12 please. Helical-Tube steam
7 generator design. The NuScale design for the steam
8 generators is different from the existing fleet. The
9 boiling is inside the tube banks, in parallel channels
10 of different lengths.

11 When NuScale did experiments to verify the
12 design, they encountered unstable flows, so called
13 density wave oscillations, with the potential for tube
14 vibration and accelerated tube wear.

15 Typically what is done in the industry,
16 in a case like this, is to take a very large delta P
17 at the inlet to the bundles. And that will suppress
18 oscillations and evenly distribute the flow in the tube
19 banks.

20 Further design work is needed, as well as
21 testing, to demonstrate that the proposed flow
22 restrictor design could adequately suppress the density
23 wave oscillations.

24 Because of these steam generator integrity
25 issues, the Staff proposed that the steam generator

1 not receive finality. And we concur.

2 In addition to further testing, the Staff
3 has also proposed a COL item and ITAAC to address these
4 matters.

5 Slide 13 please. ECCS valves.
6 Successful ECCS performance requires one of three of
7 the reactor vent valves, those are the valves at the
8 top of the pressure vessel, and one or two of the reactor
9 recirculation valves at the bottom, to create a loop.

10 However, failure of these hydraulically
11 operated valves systems are one of the most important
12 risk contributors identified in the NuScale PRA.

13 The valves are positioned by the chemical
14 volume control system. And the reactor recirculation
15 valves, in particular, are in a high boron concentration
16 environment at reactor coolant temperatures. So,
17 corrosion and valve sticking are of concern.

18 Extensive additional qualification
19 testing, required by the Staff, should demonstrate the
20 reliable performance after extended periods in an
21 operational environment and confirm the validity of
22 the PRA failure models.

23 Slide 14 please. Source term. The
24 proposed accident combustible gas monitoring system
25 design that was submitted with the DCA, would require

1 un-isolating containment and establishing a sizable
2 flow through non-safety grade, relatively large
3 diameter piping of yet unspecified length outside
4 containment, to obtain a representative sample of the
5 containment atmosphere.

6 We concurred with the Staff on not granting
7 design finality, albeit for different reasons. Theirs
8 was a concern about process sample system leakage; ours
9 was the one of un-isolating containment to a large line
10 and opening the risk of a containment bypass.

11 Design alternatives could resolve this
12 issue. Or a risk informed argument might be used by
13 the applicant at the COL stage to justify an exemption
14 from this post-PMI requirement.

15 Slide 15 please. Boron dilution. In the
16 NuScale power module, boron dilution can occur in the
17 reactor downcomer when natural circulation is
18 interrupted.

19 For example, this could happen during a
20 cool down transient or during a small break LOCA. And
21 it's due to boiling in the core because of the decay
22 heat.

23 And then subsequent condensation, either
24 on the steam generator tube banks and outer -- inner,
25 sorry, reactor pressure vessel wall. Or in the case

1 of a leak, a steam leak to the containment, condensation
2 on the containment wall, which is immersed in the
3 reactor pool.

4 It's mainly a beginning of cycle issue
5 because you have high boron concentrations there to
6 compensate for excess reactivity in the core. This
7 interruption of flow results in a situation where when
8 you boil the water that's in the core, you carryover
9 very little of the boron.

10 So the core concentration of boron
11 increases in these events. And the water in the
12 downcomer is diluted, and/or the containment vessel.

13 I note on the slide, and I have a mistake
14 to report, I have the cited NUREG report numbers
15 backwards. So on your Slide 16, as well as 15, those
16 numbers need to be interchanged.

17 But these are issues that were looked at
18 in the 1990 period, post-Chernobyl, with the existing
19 fleet.

20 So, this past February the applicant filed
21 a corrective action under its program and proposed
22 design fixes that included four orifice holes in the
23 riser, about mid-height, to redistribute the higher
24 boron concentration water in the riser to the downcomer.
25 Especially after the top of the riser is uncovered.

1 They also changed the containment level
2 and pressure set points for ECCS actuation. And this
3 was to mitigate buildup at de-borated water in the
4 containment.

5 Staff confirmed the efficacy of the orifice
6 for, orifices, in preventing boron levels in the
7 downcomer dropping below critical boron concentrations
8 out to 72 hours. However, these changes may not be
9 as effective in post-ECCS actuation with the downcomer,
10 I'm sorry, with the orifice holes being uncovered.
11 So that bypass route is defeated.

12 Next slide, 16, please. In our letter
13 reports we describe a resulting metastable state. And
14 what we mean by that is, the core, as I mentioned
15 previously, the core and the riser are highly borated,
16 but the coolant is diluted below boron, critical boron
17 concentrations in the downcomer. As well as
18 distilling, putting distilled water, essentially, into
19 the containment.

20 A rapid influx with this deborated water,
21 say, due to restoration of natural circulation, could
22 result in re-criticality, return to power and the
23 potential of core damage. Our review of the Staff
24 analyses suggest the need for a more detailed analysis
25 to prevent accidents and to develop recovery

1 strategies.

2 And I note here, this is a thermal
3 hydraulics reactor physics problem, I'm not talking
4 about developing operating procedures.

5 There are several factors at issue. It's
6 a complex problem. There are large uncertainties in
7 the boron distribution when you start analyzing it.

8 And existing methods aren't qualified,
9 really, for tracking boron concentration. So it causes
10 the analyst to make numerous assumptions about boron
11 distribution.

12 And finally, this, we're talking about
13 larger time spans than are usually considered. And
14 there are issues with numerical diffusion in terms of
15 estimating boron concentration.

16 Further, just an observation to conclude
17 this section of my report, in the early '80s,
18 inadvertent boron dilution was a topic based on
19 licensing event reports. And in those, and the
20 contractor report cited, human error was determined
21 to be a significant risk contributor. Especially
22 during refueling operations.

23 And we note that the proposed NuScale
24 nuclear power plant will have frequent refueling of
25 the modules.

1 Slide 17. Probabilistic risk assessment.

2 The PRA submitted was sufficient in scope and detail
3 to inform the DCA design to reduce risk.

4 The risk measures suggest that the design
5 meets your safety goals with large margins. However,
6 issues that I just went through, like boron dilution,
7 suggest that these margins need to be substantiated
8 going forward.

9 In particular, the importance of the CVS,
10 CVCS system, as the preferred recovery system and human
11 errors associated with building crane operations with
12 frequent heavy lifts, and as I cited earlier, refueling
13 operations, suggests further review at the COL stage.

14 Slide 18 please. Lessons learned. So,
15 in summary, the crosscutting focus area approach we
16 use proved to be effective and could be adopted for
17 future applications.

18 I note that Staff has already implemented
19 such an approach for several advance reactor designs.

20 Secondly, I note that the, for non-LWR advance
21 reactors, they're likely to be much more dependent on
22 modeling in simulation. In part, to compensate for
23 lack of experimental data and/or operating experience.

24 So, critical methodology reports need to
25 be submitted and reviewed early in the process of these

1 advance reactor reviews.

2 The completeness of new reactor design
3 should be sufficient to support requested exemptions.

4 Particularly if the application comes in under 10 CFR
5 52.

6 NuScale setup a high bar for justifying
7 exemptions from GECs and did a particularly good job
8 in technically backing up their requests. So, design
9 completeness and confirmatory experimental data will
10 be important to support expeditious review of any
11 exemption requests for future applications.

12 In the case of the boron dilution issue
13 that I discussed previously, the analysis and review
14 should continue beyond an arbitrary cutoff of 72 hours,
15 or whatever is appropriate, until such time as it can
16 be demonstrated that the plant is in a safe, stable
17 shutdown condition.

18 And finally, and here I'll borrow from Dr.
19 Bley's presentation to you last December regarding
20 methods. It may be advantageous in the review of
21 advance concepts to follow strategy for independent
22 confirmatory analysis by the Staff, starting with
23 simplicity, then adding complexity as needed. Working
24 the problem backwards beginning with bounding the
25 source term and scaling down the confirmatory analyses

1 proportionate to the hazard of the application.

2 This completes my presentation. We thank
3 the Staff and the NuScale for supporting our review.

4 I now turn to our Vice Chairman, Dr. Rempe, who will
5 speak on research.

6 ACRS VICE CHAIR REMPE: Thank you, Walt.
7 Can everyone hear me?

8 CHAIRMAN SVINICKI: Yes we can, Dr. Rempe.
9 Please proceed.

10 ACRS VICE CHAIR REMPE: Thank you. I am
11 Joy Rempe and I serve as Chair for the ACRS Safety,
12 Research Subcommittee.

13 This presentation focuses on the ACRS
14 review of the NRC safety research program, including
15 research activities to prepare the Agency for the
16 future.

17 Slide 20 please. The Office of Regulatory
18 Research, or RES, provides technical advice, tools and
19 information, for meeting NRC's mission. Including
20 resolving safety and security issues, making regulatory
21 decisions and promulgating regulations and guidance.

22 The Atomic Energy Act of 1974 mandates the
23 existing of the Office of Regulatory Research. This
24 congressional mandate recognizes that a strong,
25 technical foundation is required to support the world

1 class regulatory and expected that the RES program
2 provide this foundation.

3 Slide 21 please. Since 1974, ACRS has
4 conducted formal reviews of NRC research. Currently,
5 this activity includes our reviews of research
6 conducted in support of the specific regulatory
7 activities, periodic reviews of important ongoing
8 research, and our biennial review of the NRC's safety
9 research program.

10 Slide 22 please. Our 2020 biennial review
11 continues to emphasize the items identified in the 1997
12 Commission direction to evaluate the needs, scope and
13 balance of the reactor safety research program, the
14 progress of ongoing activities to meet Agency needs
15 and how well RES anticipates research needs and its
16 position for the changing environment.

17 Our 2020 letter report also emphasizes
18 prioritization, identification of user needs,
19 long-term planning and follow-up on prior ACRS
20 recommendations.

21 Slide 23 please. The conclusions and
22 recommendations in our biennial report were developed
23 by integrating insights from an additional meeting with
24 the director of RES to obtain an overview of his program,
25 plan, priorities and areas of interests, three, working

1 group information meetings to discuss research
2 conducted by each RES division, and other ACRS review
3 activities, such as focus reviews if important ongoing
4 reports.

5 Staff assistance was essential in
6 completing our review and we appreciate your
7 willingness to participate in this process.

8 In the next five slides, I'll highlight
9 the higher level recommendations of conclusions from
10 our letter report. As I review these guidance, I'll
11 mention selective research projects being conducted
12 within each RES division.

13 I'll also identify relevant follow-on
14 reviews that we have conducted, are planned to conduct
15 on research projects that are being performed to prepare
16 the Agency for future activities.

17 Slide 24 please. The NRC research program
18 is preliminary directed through the user need process
19 in which other agency offices provide research requests
20 to RES.

21 In addition, the agencies now providing
22 RES with a limited amount of resources for future
23 focused research with longer term horizons. Our first
24 conclusion was that the user need process satisfactory
25 meets agency near-term meetings for regulatory

1 decisions.

2 In addition, we serve as efforts to
3 initiate future focused research who will prepare the
4 Agency for upcoming challenges, including advance
5 nuclear technology regulation and agency
6 transformation activities.

7 Slide 25 please. Our letter of report
8 emphasizes that we support the systematic approach
9 implemented for RES to prioritize research emphasizing
10 enterprise risk in project selection, evaluation and
11 termination.

12 In our 2018 biennial letter report, we
13 identified the need that a systematic approach to
14 prioritize research projects. And during our 2020
15 review, we were pleased to see that a prioritization
16 approach is being implemented that consider factors
17 such as safety and security, emerging issues,
18 innovative technologies and efforts needed in
19 certainties, preservation of core competencies and the
20 development and maintenance of analysis methods and
21 tools.

22 We continue to emphasize that all RES
23 activities be prioritized and selected using this
24 process, including the future focused research
25 projects.

1 As part of the conclusion, we assert that
2 ongoing RES efforts to engage other offices are critical
3 for this approach to be successful.

4 Slide 26 please. Our letter report
5 discusses several important international
6 collaborations. Such as the new Canadian Nuclear
7 Safety Commission collaboration, that will provide the
8 Agency important data and new models for evaluating
9 non-LWR technologies.

10 As RES continues to leverage resources
11 using international and inter-agency collaborations,
12 our third conclusion emphasizes that's it's important
13 for RES to ensure that Agency priorities continue to
14 be clearly defined and addressed.

15 Slide 27. RES contributions are preparing
16 the Agency for anticipated non-LWR submittals. And
17 our letter of report emphasizes that the non-LWR
18 reference planned evaluations should provide
19 confidence about the adequacy of selected computational
20 tools and identified any remaining data gaps.

21 In the upcoming year, RES will be briefing
22 us about the results in these referenced plans
23 evaluations.

24 Slide 28. We also have briefing planed
25 that will allow us to provide input on several other

1 RES activities. Such as the efforts to address the
2 gap created by the unexpected loss of the Halden test
3 reactor, and an additional briefing on the selection
4 and process of future focused research projects.

5 We've received our first briefing on the
6 selected Fiscal Year '20 future focused research
7 project in September 2020. And we have a second review
8 plan in the next year to discuss the progress made on
9 the Fiscal Year '20 projects and the recently selected
10 Fiscal year '21 projects.

11 In summary, with respect to our biennial
12 review, I want to observe that RES has responded to
13 our 2020 letter report and indicated that they agree
14 with our recommendations and are implementing them with
15 existing RES programs and processes.

16 And the next slide, 29 please. Finally,
17 with respect to RES activities that will prepare the
18 Agency for the future, I want to emphasize that we have
19 planned information briefing since several research
20 topics that will address emerging Agency needs.

21 The future focused research projects are
22 as planned to address the Halden gap, non-LWR research
23 activities, such as results from the non-LWR referenced
24 planned evaluations, and the RES integrated university
25 programs for mission related research and development.

1 RES and ACRS have concurred that these
2 briefings, which are designed to provide timely and
3 effective ACRS input to RES, will be performed instead
4 of the quality reviews that I discussed during our
5 December 2019 ACRS meeting with you.

6 This completes my portion of our ACRS
7 presentation. And I'd now like to call on Member Brown,
8 who will provide an update on ACRS digital
9 instrumentation and control review activities.
10 Charlie.

11 ACRS MEMBER BROWN: Thank you, Joy. I'm
12 Charles Brown, Chair of the Digital I&C Subcommittee.

13 Slide 31 please. I'll be discussing and
14 presenting two digital I&C letter reports that we wrote
15 this year.

16 The first is on Regulatory Guide 1.187,
17 Revision 2, and NEI 96-07, Appendix D, Revision 1.
18 These regard the application of 10 CFR 50.59 to Digital
19 I&C modifications.

20 The second one will Be Branch Technical
21 Position 7-19. Revision 8, which is guidance for
22 defense-in-depth and diversity due to latent defect
23 common cause failures and Digital I&C systems.

24 Slide 32. I'll cover Reg Guide 1.187 and
25 Appendix D of 96-07 first. 10 CFR 50.59(c)(1) allows

1 licensees to change facilities and procedures in its
2 UFSAR, perform tests or experiments not in its UFSAR,
3 without a license amendment request if, one, the
4 technical specification changes are not required, and
5 two, the change, test or experiment does not meet any
6 of the eight (c)(2)(I) through (viii) criteria of 10
7 CFR 50.59 (c)(1). Or (c)(2), excuse me.

8 NEI 96-07, excuse me, Slide 33 please.
9 NEI 96-07, Revision 1, was issued in November 2000 and
10 provided guidance to aid industry in determining if
11 an LAR was required for facility changes based on 10
12 CFR 50.59.

13 Reg Guide 1.187, Revision 1, endorsed NEI
14 96-07 without clarifications or exceptions. NEI 96-07
15 applies to all structure, systems and components to
16 address 10 CFR 50.59 requirements.

17 Its use over the next few decades resulted
18 in several, in varying opinions and difficulties in
19 applying this guidance to Digital I&C systems.

20 Slide 34. This difficulty was the
21 interpretation of 10 CFR 50.59 item (c)(2)(vi) stating
22 that a license amendment request is needed if the change
23 would "create a possibility for a malfunction of an
24 SSC important to safety with a different result than
25 any previously evaluated in the final safety analysis

1 report as updated for DI&C changes." Very all
2 encompassing.

3 As a result, NEI developed 96-07, Appendix
4 D, to assist licensees in performing 10 CFR 50.59
5 reviews for digital modifications.

6 Slide 35 please. Reg Guide 1.187, the
7 Revision 2, prepared by the Staff, endorsed Appendix
8 D, with an exception. Which was a point of contention
9 between the NRC and NEI relating to the phrase,
10 "different result than previously evaluated in the FSAR
11 in 10 CFR 50.59 section (c)(2)(vi).

12 Slide 36 please. Our letter of report of
13 June 20th, 2019 agreed that new guidance has been
14 needed.

15 However, we concluded that there is an
16 opportunity for expanding the use of 10 CFR 50.59 for
17 Digital I&C modifications by more clearly identifying
18 the significance of different results caused by a
19 malfunction of structure systems or components
20 important to safety, as specified in Criterion 6.

21 I underlined the significance because
22 that was the point we were trying to get alone.
23 Difference, without that, is very broad.

24 Slide 37 please. Basically we urge the
25 Staff and NEI to resolve the disagreement.

1 Subsequently, NEI developed a substantially revised
2 section, 4.3.6, in Appendix D, Revision 1, dated May
3 2020, to resolve the exception.

4 The revision focused on the significance
5 of a different result to determine the need for an LAR
6 prior to a Digital I&C change. It also provided
7 numerous examples of when a change will create a
8 different result and when it will not create a different
9 result. And they upgraded that to consider, to take
10 into consideration the significance of the different
11 results.

12 Slide 38 please. The Staff agreed in
13 proposed revised draft of Regulatory Guide Revision
14 2 with clarifications only. In other words, no
15 exception.

16 During our 674th meeting, we reviewed NEI
17 96-07, Appendix D, Revision 1 and Regulatory Guide
18 1.187, Revision 2. Our letter report of June 23rd
19 agreed with the resolution and the Reg Guide Revision
20 2 should be issued.

21 Slide 39. Next I'll cover Branch
22 Technical Position 7-19, Revision 8, October 2020.
23 The BTP provide Staff review guidance for evaluating
24 any defense-in-depth and diversity means credited to
25 address vulnerability to common cause failures.

1 It applies for any new plant designs or
2 changes to any existing plants that require NRC
3 approval. It does not apply to changes under 10 CFR
4 59. 50.59.

5 Slide 40 please. The revision maintains
6 the policy established by the Commission in SRM to
7 SECY-93-087.

8 It's further amplified by identifying the
9 need for a well-defined Digital I&C architecture
10 meeting the fundamental design principles to identify
11 defense-in-depth and diversity needs.

12 It also introduces the use of safety
13 significant assessment categories, high, lower and
14 lowest. It also identifies means to eliminate and
15 mitigate common cause failures and how some common cause
16 failure consequences may be acceptable.

17 And that is a new item. In other words,
18 when you evaluate the common cause failure, you might
19 find that the end result is acceptable and you don't
20 have to worry about what it does.

21 Slide 41 please. It revises guidance on
22 spurious actions and diverse manual actions. And it
23 also includes use of qualitative assessments per
24 Supplement 1 to Regulatory Issues Summary 2002-22 for
25 non-reactor protection systems and engineered safety

1 feature actuation systems.

2 I want to make sure you focus on, it's a
3 non-reactor plant protection systems and engineered
4 safety feature actuation systems.

5 Slide 42 please. Our recommendations were
6 as follows. Number 1 was that the Revision 8 should
7 be issued subsequent to incorporation of our Revisions,
8 Recommendations 2 and 3.

9 Recommendation 2 was that the branch
10 technical position discusses combining or integrating
11 of the reactor trip system in ESFAS and associated
12 communications architectures into a single protection
13 system. This approach challenges two critical
14 defense-in-depth and diversity elements: redundancy
15 and independence.

16 The branch technical position should
17 ensure that reviewer is verified, that fundamental
18 architecture principles are maintained.

19 Slide 43 please. The third recommendation
20 was that the branch technical position should ensure
21 that interconnections between high safety significant
22 systems and those of lower safety significance, are
23 one-way, unidirectional digital communication devices
24 rather than bidirectional communication devices.

25 The use of bidirectional reduces

1 independency and defense-in-depth. And this was, we
2 recommended this to preclude the comprise of high safety
3 significant systems.

4 That concludes my presentation. Matt,
5 I'll pass it back to you.

6 ACRS CHAIR SUNSERI: Thank you, Charlie.
7 Chairman and Commissioner, this concludes our prepared
8 remarks. We are now ready for your questions.

9 CHAIRMAN SVINICKI: Thank you very much,
10 Chair Sunseri, Vice Chairman Rempe and all ACRS Members,
11 for your work on the topics that were presented, but
12 also on the numerous letter reports and topics that
13 we did not select as presentations for today. Thank
14 you.

15 It's quite an extensive body of work. And
16 you were also working under the unplanned circumstance
17 of the public health emergency, so the Commission is
18 very grateful for your efforts.

19 For the Commissioner questioning today,
20 we will begin with Commissioner Caputo.

21 COMMISSIONER CAPUTO: Good morning.
22 Thank you all for joining us today.

23 I'd like to begin my questions with Dr.
24 Rempe. On Slide 25 you stated, we support the
25 systematic approach implemented by research to

1 prioritize the research projects emphasizing
2 enterprise risk and project selection evaluation and
3 termination.

4 Would you please discuss the emphasis on
5 enterprise risk as opposed to safety significance and
6 safety risk?

7 ACRS VICE CHAIR REMPE: Sure. Clearly,
8 the research programs are investigating safety. But
9 as they select projects over the years, there are some
10 other factors that should be considered.

11 For example, at one point in time a
12 particular research project may have significant safety
13 issues. But as the years go by they may learn things
14 from this initial research that may demonstrate that
15 safety is no longer important.

16 The interest in that research may decrease.

17 For example, right now, we are very concerned about
18 the non-LWR applications that may be facing the Agency.

19 If, for example, some of the interest in
20 these non-LWRs decreases, that should be considered.

21 It may still be a safety issue, but if no one is going
22 to build them that may not be as important.

23 So, we need to consider that. We need to
24 consider the core competencies.

25 When the events of Fukushima happened,

1 certain core competencies in their preservation can
2 be very important even though perhaps they didn't seem
3 important until we had that event. So it's good to
4 think about the various aspects, as I mentioned in the
5 list of items and enterprise risk during my
6 presentation.

7 And if the Agency tries to prioritize the
8 research, they need to consider all of these factors.

9 And I believe that's now being done. Did that help?

10 COMMISSIONER CAPUTO: Yes. Thank you.
11 I'm going to continue in that vein though.

12 You noted how ACRS examines the needs,
13 scope and balance of the reactor safety research
14 program. How well it anticipates research needs and
15 how it's positioned for a changing environment.

16 However, I remain concerned that the
17 research portfolio may be overly focused on historic
18 issues and may not have that proper balance with forward
19 looking work.

20 So, what I'd like to ask is, and maybe other
21 Members would like to comment, but in reviewing our
22 research, does the Committee specifically examine
23 whether projects remain safety significant or whether
24 they're simply pursuing increasingly minute levels of
25 accuracy such that further research is unlikely to alter

1 existing regulatory activities?

2 Because I would be concerned that if we're
3 not seeking out that distinction point where we're
4 pursuing resource, it's not going to change the nature
5 of what we do, then it may be important to reallocate
6 those resources to more forward looking issues.

7 Can you just give me a sense of your views
8 on that? And whether or not you think we're striking
9 the right balance.

10 ACRS VICE CHAIR REMPE: I believe we are
11 trying to strike that correct balance. I call your
12 attention, in the division of engineering section of
13 our biennial 2020 report.

14 And it reports several activities that are
15 going to be ceasing. And they may have been terminated
16 by this time, but there are issues that we regularly
17 have brought up over the years.

18 And in 2018 we mentioned them. And in
19 2020, in our report, we reported that these activities
20 should be, they are, the Staff reported they are being
21 finalized.

22 The final documentation is being completed
23 and they should be terminated at this time. We'll
24 follow up on that in your 2020 report.

25 But yes, we do try and quiz the Staff on

1 those points. And we have our information briefs on
2 the projects within each division.

3 COMMISSIONER CAPUTO: Okay, thank you.
4 I'd like to move on to Digital I&C with Mr. Brown.

5 On Slide 30. I gather the ACRS is working
6 to define the significance of a different result, it
7 came up several times.

8 I'm a little concerned that developing a
9 common understanding or a working definition is often
10 something that is helpful to do at the outset of a
11 project. So, at this point, it seems that it's
12 difficult to tell whether we're actually nearing the
13 finish line with Digital I&C or whether we're continuing
14 to be stuck in a perpetual debate over definitions of
15 terms.

16 So you indicated that branch technical
17 position 7-19, Revision 8, should be issued once two
18 additional recommendations are incorporated. You also
19 indicated that Reg Guide 1.187, Revision 2 should be
20 issued with clarifications.

21 Can you tell me when you expect these
22 documents to be final and whether they provide enough
23 regulatory clarity and stability for licensees
24 ultimately to successfully pursue and implement Digital
25 I&C upgrades?

1 ACRS MEMBER BROWN: Okay. Well, I'll try
2 to adjust this, address this, in a generalized manner,
3 as well as specific.

4 The definition of once you integrate or
5 try to integrate a couple of systems together provides
6 a difficult, how do you address that when you put stuff
7 together and put it into one system.

8 The integration of those two systems is
9 not what we would, any of us would think to be a primary
10 consideration and combination. And they address that
11 in 96-07. Relative to addressing some other systems.
12 Like the feedwater control system.

13 The feedwater control system, right now
14 in most of the plants, has four, there is three or four
15 valves, if you're a light water reactor with four loops.

16 COMMISSIONER CAPUTO: Mr. Brown, I think
17 you misunderstand the nature of my question.

18 ACRS MEMBER BROWN: Oh, okay.

19 COMMISSIONER CAPUTO: My question is much
20 more in the vein of, are we done yet. I think it's
21 been mentioned by the Commission, several times in the
22 past, including one by myself, the Airbus 320 took off
23 in 1987 with digital technology. The Navy Seawolf
24 program in 1989, the Boeing 777 in '94. Not to mention,
25 the geneses of Digital I&C was actually the NASA's

1 Apollo Program.

2 What I'm concerned about is whether or not
3 we're actually coming to closure and resolving these
4 issues. These debates, the nature of what you were
5 just explaining to me, I'm guessing these debates and
6 discussions have been going on for over 30 years.

7 My question is targeted at closure. Are
8 we actually reaching resolution or does the debate
9 simply continue indefinitely? That's the nature of
10 my question.

11 ACRS MEMBER BROWN: Okay. I understand.
12 I did not understand that at first.

13 So I'm going to give you a background and
14 a little bit of history. Twelve years ago I came on
15 to this Committee to address, to try to help the
16 Committee to address how do we incorporate Digital I&C
17 systems into the plants. Whether they're existing or
18 a new design certifications.

19 I sat in on my first subcommittee meeting
20 in July or August of 2008. The presentation by the
21 applicant at that time, and this is my personal opinion,
22 was terrible. You couldn't tell what was going on.

23 The effective way to evaluate this stuff,
24 the vendor would give you a stick-man type architecture,
25 and then they would say we will agree to comply with

1 every reg guide regulation position that is in all your
2 standards.

3 However, you couldn't tell, it was like
4 evaluating, if you're going to design a car, I'm going
5 to evaluate the brake line, then I'm going to look at
6 the fuel line, and then I'm going to figure out how
7 the carburetor works, but I don't know how they all
8 fit together to make a car.

9 We, at that time, told them that it was
10 an unsatisfactory approach. There was no
11 architecture, how you can define and understand what
12 this basic system looks like and how you maintain the
13 fundamental principles of redundancy and dependence,
14 diversity and defense-in-depth, deterministic
15 processing, simplicity, control of access, the whole
16 panoply of what I call basic fundamental design
17 principles.

18 It took about a year and a half or two before
19 that particular project finally presented an
20 architecture where we could become to the point where
21 it was satisfactory and would work satisfactory and
22 we could agree with it. And we wrote a letter to say
23 such.

24 The second project came along was AP-1000.
25 Somebody was obviously listening. We had a much

1 better architecture presented.

2 It didn't take as long to get through it.

3 There were a couple of issues. And the AP-1000
4 applicant complied.

5 And then the third project was the Korean
6 KHNP. They presented theirs. They obviously had
7 really been listening. I don't think it took us hardly
8 any time at all to review that project and agree with
9 it.

10 And when NuScale came along, I think it
11 took six or seven months to go through all the details.

12 And they fully complied with the idea that an
13 architecture complete, where you can see how you
14 maintained independence redundancy and all those
15 principles, that's the bull work.

16 That's the framework you have to prove to
17 ensure you got a satisfactory system. It took about
18 six months to do that.

19 So if you ask me my judgment, we have made
20 significant progress over the last ten to 12 years.
21 I can't speak for the previous years, from 1987 to 2008,
22 I was in the Naval Nuclear Program at that time
23 developing all the Naval nuclear Digital I&C systems
24 from 1978 until December 1999.

25 So I was appalled when I first got here.

1 Right now, we have issued, and just to put it in a
2 track, a ISG-6, I believe it was, initiated a project
3 to do pre-review or pre-application reviews where the
4 focus was on the architecture of the systems to make
5 sure the vendors understood what the staff wanted.
6 That was after the first one back in 2008.

7 Subsequent to that, I guess, I've forgotten
8 which SRM or which SECY it was, talking about
9 risk-informed and technology-neutral type stuff. And
10 a DSRS was put into place for the mPower SMR. And that
11 design-specific review standard fundamentally focused
12 on the architecture and went through all the various
13 items that I've just discussed to show that it met that.

14 That was a much simplified approach, it
15 was more easily understood, and it was able to be agreed
16 to pretty readily. That same architecture, that same
17 principle in the mPower DSRS, was then translated into
18 the NuScale, which allowed us to complete that review
19 in a matter of six, seven, eight months.

20 So right now, we're on track. Two things
21 have happened. One, we have now issued BTP 7-19, which
22 incorporated this thought process into the
23 defense-in-depth review of any new project to ensure
24 that we don't beat it to death for no known reason.

25 The same thing applies with the general

1 approach for a new design application. There's a new
2 design-specific review standard called design review
3 guide for non-light water reactors, which now breaks
4 down the architecture and walks through each of those
5 features, and that's how the design will be assessed
6 in the future.

7 We've just completed a review of that and
8 will soon be issuing a letter. And so if you ask my
9 opinion, we have made giant steps over the last ten
10 years. Has it been difficult? Yes. Has it been easy?

11 No. Are every piece, you know, little piece of it
12 complete? I don't think so. But compared to what was
13 established back 25 years ago, I think -- or 30 years
14 ago even, I think the progress has been quite good.

15 And this committee, in fact, has been the
16 lead since 2008 in making sure this happens. The staff
17 has done a very good job of incorporating those thought
18 processes in putting together over these various
19 projects that projects that have come along and included
20 the lessons learned from back fits and put together
21 some new documents that are very streamlined and helped
22 those reviews be streamlined.

23 Did that answer your question?

24 COMMISSIONER CAPUTO: Yes, I believe it
25 did.

1 CHAIRMAN SVINICKI: Thank you very much,
2 Commissioner Caputo. Next we will hear from
3 Commissioner Wright.

4 COMMISSIONER WRIGHT: Thank you. I
5 thought somebody was trying to add on. Okay, we're
6 over -- okay, thank you. Thank you very much.

7 So good morning, and I thank you for the
8 presentations. And also, you know, especially during
9 these challenging times during the pandemic and
10 everything, we want to thank you for the way you're
11 doing what you're doing. Because the independent
12 advice that you give us is very -- is critical to what
13 our Agency's doing. So thank you for that.

14 Chairman Sunseri, I appreciate that you're
15 keeping up on the Agency transformation efforts and
16 leveraging technology to do your work during this health
17 emergency. You indicated on one of your slides, I
18 believe it was slide 7, but we don't have to pull it
19 up, but you indicated that you met with the OEDO
20 representatives early in 2020 to discuss transformation
21 activities, and that you interact frequently on staff
22 changes.

23 Can you tell me a bit more about these
24 interactions with the OEDO staff? And do you have a
25 single point of contact on the ACRS when, you know,

1 who I guess would transmits any information activity
2 to the rest of the group, or does the staff provide
3 information to the ACRS, or is there some other way?

4 ACRS CHAIR SUNSERI: Thank you for the
5 question. So there's a couple of ways that we keep
6 up with this. First off, I would say Scott Moore, our
7 Executive Director, has close tie-ins with NRR and the
8 other offices on the other side of the Agency. And
9 that is in fact how we stayed abreast with the EDO's
10 office.

11 We had committed to the Commission through
12 one of our letter reports that we would keep up with
13 what is going on with the Agency's transformation
14 activities and then align ourselves with some of those
15 or, you know, integrate some of our own ideas.

16 So Scott Moore, our Executive Director,
17 actually set up that meeting with EDO office because
18 it had been about a year. And we had a good presentation
19 that actually opened our eyes to the fact that there
20 had been a change in direction somewhat from where we
21 had originally set up our transformation activities
22 to where the Agency is currently going with the four
23 focus areas and seven initiatives.

24 And that's how we learned about Be
25 riskSMART or more details about Be riskSMART and more

1 details on some process simplification with regard to
2 upcoming applicants, of which we're trying to align
3 our processes with also. So through our Executive
4 Director's contact into the other offices is one way.

5 The second, another way is each one of our
6 -- we have technical staff and we have administrative
7 staff under Scott that interfaces routinely with NRR
8 and others on the other side about what's going on.

9 And that's -- that, to some extent, that's
10 how we worked out our arrangement with NuScale on the
11 different review that Dr. Kirchner talked about in his
12 presentation was, you know, through our staff
13 interaction with us. So that's another example of the
14 way we find out about transformation activities that
15 are going on in the other agencies.

16 And you know, we just continue to pursue
17 that with the respect to subsequent license renewal.

18 We're working right now on a Memorandum of
19 Understanding to, you know, more integrate or more
20 delineate, I should say, how we're going to conduct
21 those reviews when we find out that a subsequent license
22 renewal activity has, you know, is technically sound
23 and no significant challenges to it and no open items.

24 We should be able to take those straight to full
25 committee and save everyone a lot of effort on that.

1 So those are just kind of three examples
2 of the way we do it, and there's probably more going
3 on behind the scenes that I don't even know about.
4 But I hope that addresses your question.

5 COMMISSIONER WRIGHT: Yeah, thank you.
6 So some of the current transformation and innovation
7 activities you just mentioned you're tracking, what
8 do you consider maybe the most relevant to ACRS and
9 its work, of these transformation activities?

10 ACRS CHAIR SUNSERI: Yeah, so I think the
11 riskSMART is clearly one. I mean, the ACRS has been,
12 you know, an advocate of using risk techniques all
13 along. I mean we're right on the front end of it.
14 So any time we can enhance or improve safety by taking
15 a risk-informed approach to it and avoid doing things
16 for the sake of doing them and then doing things that
17 have -- and then focusing on things that are more
18 risk-significant and make a difference, that's clearly
19 something that we're interested in.

20 So the -- so you know, our risk activities
21 and the things we're involved with as far as further
22 promulgating or further moving the agency towards being
23 a risk-informed, more risk-informed going into the
24 future is certainly an area that we're very closely
25 aligned with.

1 COMMISSIONER WRIGHT: Have you, has ACRS
2 engaged at all with EMBARK Venture Studios?

3 ACRS CHAIR SUNSERI: I am not aware that
4 we have. I saw that term come up the other day in some
5 communication. I wasn't, I'm not familiar with it,
6 maybe one of the other members are.

7 COMMISSIONER WRIGHT: Okay. Yeah, just
8 if you have or I just wondered if there were any
9 initiatives that you all felt that you could benefit
10 from. So we can talk offline on that at another time.

11 So during this whole pandemic thing, you've
12 being doing a lot of things virtually. Are there
13 anything that you've been doing now that you feel might
14 be best continued in a virtual way, or do you think
15 there are some things that absolutely have to be done
16 in person?

17 ACRS CHAIR SUNSERI: So I mention that we
18 are looking at using virtual technology after the
19 pandemic restrictions are gone. And we think there
20 is an opportunity to engage applicants and maybe staff
21 and even some of our own members in a way to where we
22 don't to bring everybody together in the room at the
23 same time.

24 Now, I think our experience is that
25 transactionally, our meetings have gone very well and

1 we've moved business forward and we've conducted very
2 thorough and good reviews. There is a little bit, I
3 would say, and I'll inject my personal opinion somewhat
4 here, is I think there is a little bit of -- a little
5 bit of lost interpersonal reaction loss on the virtual
6 meetings.

7 I mean, where you're together in a room
8 face to face, you can read the whole language of the
9 room. And it gives you a little bit different sense
10 sometimes of how a topic is percolating through the
11 group when you can see, you know, the shrugs or, you
12 know, the mannerisms of the group as a whole.

13 When we're in this virtual context,
14 oftentimes we don't even have the cameras on, we're
15 just listening to a voice. Or like in this particular
16 example, you only see my face versus the nine other
17 members.

18 COMMISSIONER WRIGHT: Right.

19 ACRS CHAIR SUNSERI: So, you know, we are
20 looking forward to getting back to face to face, but
21 we recognize that the virtual meetings have added a
22 dimension that is actually beneficial for us, and I
23 think we're going to continue some of that. We're going
24 to integrate it in with our business going forward.

25 COMMISSIONER WRIGHT: Right. With the

1 time I've got left, I'll bring Dr. Kirchner in and talk
2 a little bit about NuScale, because it's been in the
3 news lately and it's certainly timely. So my
4 understanding is that the ACRS disagreed with the staff
5 on certain conclusions and recommendations regarding
6 the boron redistribution issue that were outlined in
7 that report.

8 I believe there were certain
9 recommendations and conclusions, three of them I
10 believe that were primarily focused on operator
11 recovery actions. Can you tell me a little bit more
12 about those disagreements and, you know, and how you
13 all went through that?

14 ACRS MEMBER KIRCHNER: Thank you,
15 Commissioner. Well, this was an issue that we -- a
16 little history first. We identified this, when I look
17 at my notes, probably a year ago June was the first
18 time that this surfaced. And it made our short list
19 of focus areas that, obviously.

20 And earlier this calendar year, when
21 NuScale came back with their proposed changes, these
22 were definitely an improvement. They certainly
23 addressed the cooldown transients that were a concern
24 that resulted in boron dilution.

25 Where we probably were looking for more

1 detailed analysis was in the case of post-ECCS actuation
2 where the boron concentration in the downcomer can drop
3 below the critical boron concentration within hours.

4 As I mentioned, this is a, it's a difficult problem
5 to analyze. There are a lot of factors that you have
6 to consider.

7 Our current code suite that is used, both
8 by the applicant and for that matter the confirmatory
9 codes that the Agency has, aren't really well suited
10 for tracking boron distributions and mixing. And the
11 staff, it's not that we disagreed with the staff per
12 se. The staff did a couple of bounding analysis
13 scenarios. Those were good.

14 Sometimes the problem isn't easily
15 bounded. Our big concern really was that there is the
16 possibility in trying to recover from such an event
17 that you could restore natural circulation. Now,
18 depending on what the boron concentration is in the
19 downcomer and/or the containment, you have the
20 possibility of sweeping quickly a large volume of
21 de-borated water into the core.

22 And that's our concern. And so it's not
23 so much that we disagreed with the analyses that the
24 staff presented. It was more a completeness
25 perspective on our part, I believe, to further explore

1 the issue and ensure that the recovery options that
2 are at hand will actually take you to the safe condition.

3 So that doesn't perhaps really answer your
4 question, but I don't think it's so much, again, I would
5 say it's not so much that we disagreed with the staff's
6 analyses, but we think that there's more work to be
7 done on this issue.

8 COMMISSIONER WRIGHT: Okay, thank you,
9 thank you, Chairman.

10 CHAIRMAN SVINICKI: Thank you,
11 Commissioner Wright. Next we'll hear from
12 Commissioner Hanson. Please proceed.

13 COMMISSIONER HANSON: Thank you, Chairman
14 Svinicki. Good morning, everyone, it's nice to meet
15 you all virtually. I wish we could at some point I
16 hope we can be in the same room together. As the new
17 guy, I'm -- this is my first opportunity to kind of
18 be with you all collectively, so it's good be here.

19 CHAIRMAN SVINICKI: I was just going to
20 mention that if we didn't have the public health
21 emergency, in general the ACRS gave a wonderful holiday
22 gathering after this December meeting with the
23 Commission, which was always such a nice part of doing
24 some fellowship in the holidays. So Commissioner
25 Hanson, I hope we do get back to that.

1 COMMISSIONER HANSON: Yeah, I hope we do,
2 thank you.

3 I'll start with Dr. Rempe. Thank you for
4 your presentation this morning. Advanced reactor
5 issues are getting a lot of attention. But I've been
6 thinking about other parts of the advanced reactor fuel
7 cycle, such as transportation, storage, security, waste
8 management, enrichment, fuel fabrication, etc.

9 And I'm wondering if those issues are also
10 getting, or if they are getting sufficient attention
11 from a research standpoint. The ACRS noted in its
12 bi-annual -- biennial evaluation letter that a
13 systematic approach is being implemented by RES to
14 prioritize research, emphasizing enterprise risk in
15 project selection evaluation and termination.

16 So to what extent are these other areas
17 being considered as potential research projects?

18 VICE CHAIR REMPE: Thank you for the
19 question. I would draw your attention to the point
20 that we raised in our letter report about the need to
21 look at some of the unique issues posed by some of the
22 advanced reactors where they plan to load the core
23 offsite and transport a reactor with a loaded core to
24 the site. And then after the fuel is burned, I'll take
25 the reactor with the spent fuel back and do something

1 with the core at a different location.

2 And we have raised that in several of our
3 meetings. And I was pleased to see that, that issue
4 is starting to be addressed, and in fact Amy Cabbage
5 brought it up in the stakeholder meeting recently and
6 I think it was last October. So we aren't yet aware
7 of how the staff will deal with some of these issues,
8 but the staff is cognizant of it, and we will be
9 exploring that topic in some of these additional
10 briefings that we're going to be holding.

11 We explore it not only through the research
12 venue, but also we have a separate subcommittee (audio
13 interference) of the advanced reactors, future
14 licensing activity. So we've been going through the
15 reports issued by the staff for the various methods.

16 And we had one of those meetings this week
17 and we brought up some of those issues that you're
18 mentioning with Volume 5 for the codes that the staff,
19 so we've been asking them how they were going to deal
20 with those aspects of the fuel cycle.

21 So yes, research is starting to address
22 that. We are just starting to consider it in our
23 reviews and we haven't issued a letter on it, but I
24 believe we will be discussing it in our one of our letter
25 reports in the upcoming year.

1 Does that help, or --

2 COMMISSIONER HANSON: Great, yeah, very
3 much so.

4 VICE CHAIR REMPE: --- did I answer your
5 question?

6 COMMISSIONER HANSON: Yeah, no, thank you,
7 that's very helpful. I really appreciate that.

8 I want to turn to digital I&C. I
9 appreciated the interaction between Commissioner
10 Caputo and Mr. Brown on this subject. Mr. Brown, you
11 mentioned ACRS's involvement in evaluating the digital
12 I&C systems with NuScale and other technologies that
13 are coming down the pike.

14 To what extent has ACRS been involved in
15 looking at application of digital I&C systems to
16 existing plants? Say, at Limerick or other utilities
17 that are exploring this or have put forward draft
18 proposals?

19 ACRS MEMBER BROWN: Well, at this point
20 we don't look at anything until there's a formal request
21 for an LAR from the applicant, from the operating plant,
22 whoever owns it, and they submit that to the NRC.

23 COMMISSIONER HANSON: Okay.

24 ACRS MEMBER BROWN: And then there's a
25 review period established, and then our -- we get

1 scheduled with the documentation. And then
2 subcommittee meetings and follow-up with full committee
3 meetings. But at this point, the only one we've dealt
4 with in the last few years was Diablo Canyon. None
5 others.

6 The only other one I can remember -- an
7 Oconee one was done back in 2008, but that was, I'd
8 just walked in the door at that time, so that was
9 fundamentally done by the time I got here. So we have,
10 our committee doesn't do much of anything until there's
11 a formal application with the details provided to the
12 staff.

13 COMMISSIONER HANSON: Thank you for that.
14 I mean, let me follow up. I mean, at this point,
15 though, with the recommended revisions to the BTP and
16 the reg guide, do you feel like the staff is
17 well-positioned then to expeditiously evaluate LARs
18 or other proposals for digital I&C systems on existing
19 plants?

20 ACRS MEMBER BROWN: Yes, in particular
21 most, in my person opinion based on the new things in
22 1.187 and the NEI documents, with the exception of the
23 reactor trip systems and ESFAS systems, engineered
24 safeguard safety feature systems, they provide many
25 examples of how you can proceed with those without

1 getting wrapped around the axle. So I think that's
2 a significant improvement in where we're going with
3 that.

4 The new design review guide that we're
5 presently in process of reviewing is a substantial
6 improvement over the old standard review plan that,
7 in NUREG-0800, that has been used for decades. It
8 focuses on the architecture, which takes it from a
9 bottom-up review approach to a top-down review
10 approach, where it simplifies what you have to look
11 at.

12 If you have an architecture that defines,
13 maintains your key issues of redundancy and
14 independence, those are the linchpins. And if you can
15 show that in an architecture, now you have to only look
16 at a few details within the design to say is there
17 something we missed that's based on some different types
18 of systems that you put in to, you know, to do the
19 computations.

20 So I think the position of the new reg
21 guides for new plants, I think that new design review
22 guide, which we haven't, you know, we're about to send,
23 issue a letter to the staff. It's for non-lightwater
24 reactors, but without question the entire guide could
25 apply to lightwater reactors, if somebody wants to do

1 that. Or for operating plants to upgrade their I&C
2 systems.

3 And as a matter of fact, we made a comment
4 of that in our letter which will be issued probably
5 in the next week or so. Or two weeks, whatever it is
6 to get us through the editorial process.

7 COMMISSIONER HANSON: Okay.

8 ACRS MEMBER BROWN: So yes, I think the
9 documents that have come out have given the applicants
10 the opportunity to do it. The next issue after that
11 is execution. And hopefully the committee will be able
12 to help the staff in the reviews and help expedite those
13 -- the execution in order that the plant requests can
14 be processed expeditiously.

15 COMMISSIONER HANSON: Great, I hope so
16 too, because I share Commissioner Caputo's question
17 of kind of are we there yet.

18 ACRS MEMBER BROWN: Well, you're all both
19 right on the numbers. This has been a frustration of
20 mine ever since I got here 12 years ago.

21 COMMISSIONER HANSON: Yeah, I can --

22 ACRS MEMBER BROWN: The Committee invited
23 me to be a participant, a member, just so that we could
24 try to get a handle on this. Hopefully we've done that.

25 COMMISSIONER HANSON: I hope so too, and

1 thank you for your service on the committee for these
2 last 12 years.

3 ACRS MEMBER BROWN: Thank you.

4 COMMISSIONER HANSON: I look forward to
5 more of that.

6 ACRS CHAIR SUNSERI: Commissioner? I'm
7 sorry to interrupt, Commissioner, this Matt Sunseri.
8 May I be recognized?

9 COMMISSIONER HANSON: Sure.

10 ACRS CHAIR SUNSERI: So I'd like, if I
11 could, I'd like to offer a non-I&C professional
12 perspective on this topic. And I may be outside my
13 swim lane on this, and Charlie can correct me, but you
14 know, I think the Agency has done a good job of
15 identifying all the issues that are bounded around this
16 topic.

17 And there's a program called the Integrated
18 Action Plan that is updated and maintained that has
19 kind of all the issues in one place, and the Agency
20 is systematically working through those things. And
21 that's how we get involved in these activities as they
22 review things and come through this Integrated Action
23 Plan, then we get involved with it.

24 And so I think that plan is progressing
25 quite nicely, and it's probably nearing the maintenance

1 mode of performance here. But that, like I said, this
2 is just a non-I&C professional view on that, and I'll
3 yield now.

4 COMMISSIONER HANSON: Thank you, Chairman
5 Sunseri. But while I have you, I want to close with
6 one last question. In the ACRS's report from this past
7 October regarding Part 53 licensing and regulation of
8 advanced nuclear reactors, there's a paragraph at the
9 end that caught my attention on fusion reactors. And
10 I thought your comments about the potential application
11 of a to be developed Part 53 to those fusion reactors
12 was really interesting.

13 But I wanted to get your thoughts on, and
14 various folks are out there in the fusion community
15 are also talking about potential application of Parts
16 20 and 30 and wanted to get your thoughts on that as
17 well.

18 ACRS CHAIR SUNSERI: Thank you for that
19 question. So Part 53 with respect to fusion reactors,
20 our comment on that is we seek -- and there's a lot
21 of debate, I think, in the industry about how much
22 regulation is needed on the fusion reactors. But we
23 see there's enough, I'll call, lack of better words,
24 I'll say hazards associated with operation of fusion
25 reactors that can create concerns for public that we

1 feel need to be addressed. And so we are prompting
2 that those kind of issues be taken up in Part 53.

3 COMMISSIONER HANSON: Okay, thank you,
4 Chairman.

5 CHAIRMAN SVINICKI: Thank you very much,
6 Commissioner Hanson. And perhaps this -- my question's
7 built a bit on what my colleagues have been asking about,
8 not surprisingly, but maybe slightly different angle
9 on some of these. Let me begin where Commissioner
10 Hanson left off on the ACRS involvement as the
11 provisions of Part 53 take shape. And also I think
12 there's some connective tissue with the lessons learned
13 letter report on the aspects of the review of advanced
14 reactors.

15 And I, the staff has been, and I think been
16 encouraged by the Commission, but also intended to take
17 a little bit of a more iterative approach to the
18 development of the draft language for Part 53, just
19 given the enormity of what they're trying to take on
20 here.

21 And I think that that, or I'm optimistic
22 that that will serve them well because they won't get
23 too far down finishing brush strokes on something that
24 then they get feedback and get feedback and realize
25 that they have to go about it a very different way.

1 But as a result the ACRS's engagement, you
2 know, in my view probably shouldn't wait for a proposed
3 rule itself because the staff would be pretty far down
4 the road. Chairman Sunseri, can you talk a little bit
5 about how the ACRS intends to structure or approach
6 its engagement on the broad kind of lessons learned
7 from advanced reactors reviews, and then folding some
8 of those insights into your engagement with the NRC
9 staff on their development of Part 53?

10 ACRS CHAIR SUNSERI: Thank you for the
11 question. Well, we see Part 53 as an important rule
12 in the future and so we want to be engaged with that,
13 and we've had early engagement.

14 We actually have a member that is assigned
15 a lead for us in this area, Dr. Bley is following this
16 area pretty closely for us, and so we have staff members
17 also that work with, across the aisle as they would
18 say with the NRR to keep up with things. And we expect
19 that as activities progress, that we -- and we have
20 requested for early on engagement, we think that is
21 important.

22 And as an independent committee, we have
23 to be a little cautious about how early we get involved
24 and what kind of involvement we are with, because we
25 don't want to become so part of the process that we

1 lose our objectivity to evaluate it at the end.

2 CHAIRMAN SVINICKI: Well, thank you for
3 that caution. But I -- the staff will need to develop
4 and cover some new ground here, so I think that having
5 the benefit of some perspectives, given the vast
6 experience of a lot of the ACRS members, will be helpful.

7 And I'm confident that between the staff and the ACRS
8 members, you can strike the right balance there.

9 ACRS CHAIR SUNSERI: If you would like to
10 recognize Member Bley, he may be able to provide some
11 additional details for you.

12 CHAIRMAN SVINICKI: Certainly. Dennis,
13 did you want to chime in?

14 ACRS MEMBER BLEY: Yes, I do. Thank you
15 very much, Chairman. Yeah, a couple of things with
16 respect to what you raised with Commissioner Hanson's
17 questions. I think on Part 53, we're just beginning
18 to interact with the staff. We have a meeting coming
19 up, I think it's in January or February, on the fusion
20 in the Part 20 and 30, the rad protection and the
21 by-product where I think we even mention tritium in
22 our last letter report. We'll be focusing on those
23 and urging the staff to.

24 But fusion's going to be kind of tricky.
25 It's, I'm not sure how well that's going to integrate

1 with the rest of Part 53. So we'll be talking with
2 the staff and probably with you folks along the way.

3 You mentioned the role of lessons learned
4 in Part 53, and I think that's important. We've already
5 been pulling that into the beginnings of our reviews
6 of the new design certs that'll be coming in on new
7 reactors and raising those issues. So they're
8 beginning to feed in that way first. And we've pushed
9 on this and it seems that the same people on the NRC
10 staff who will be developing Part 53 will be heavily
11 involved in those other activities. So I think we'll
12 get good cross-fertilization through that path.

13 So we agree with the issues you raised,
14 and I think we'll be following those and urging the
15 staff to be proactive in looking into these areas in
16 great detail.

17 CHAIRMAN SVINICKI: Thank you for that,
18 that's helpful. And I won't project onto Commissioner
19 Hanson's question, but I will just say for myself on
20 the fusion approach, coming at it as an individual,
21 my view was it may be the world's least comfortable
22 fit to have fusion in there, but if you scope it out
23 before you start, then you don't reach that conclusion.

24 And if you try to have it in, given the
25 early stages that the staff is at, I felt like maybe

1 you would discover it doesn't have a good home in Part
2 53. But you don't know if it washes out before you
3 even explore that. So I just want to say that's how
4 tepid my conclusion was. It was really based on more
5 procedural just awareness than anything else. So I
6 share the notion that it may ultimately not have a good
7 home there, but we don't know that now.

8 And I did want to turn to Dr. Rempe on the
9 passing mention in the letter report on the
10 discontinuous -- the discontinuation of access to the
11 Halden reactor. And of course that's not just for NRC,
12 that's for the global research community, given the
13 decision about not extending the operation of that
14 facility.

15 I noticed in an ACRS letter report on a
16 topical report on fuels was mentioned again about that,
17 that may severely complicate the ability for fuel
18 developers to submit the kind of data that they would
19 need. And I know that going forward, this'll be much
20 on the mind of the ACRS. But Dr. Rempe, was there --
21 I've also heard from others that say, I don't know,
22 maybe not waiting all the way for the Versatile Test
23 Reactor but, or truly new capacity.

24 But that this issue of the loss of Halden
25 is, from some they portray it as more manageable than

1 others. Nobody's thrilled about it in the research
2 community. Could you speak to that? Is this, you
3 know, a real kind of a deep concern for the ACRS? I'm
4 putting you on the -- part of the continuum of people
5 who find this severely problematic.

6 VICE CHAIR REMPE: Thank you,
7 Commissioner, for that question. My colleagues on the
8 ACRS will probably acknowledge that I'm the one who
9 often brings this up because that topic is near and
10 dear to my heart. With respect to the capability of
11 having a thermal test reactor, which is what the Halden
12 reactor was, the Versatile Test Reactor will be a fast
13 reactor if it is -- or if it is actually built, which
14 is down the road a bit.

15 But we do have in the world other reactors
16 that have loops that could probably accomplish much
17 of the mission of the Halden reactor. For example,
18 there's the BR2 in Belgium and there's the ATR here
19 in the US. But what we lack is the capabilities with
20 respect to instrumentation and the ease at which it
21 was performed at Halden because of their standardized
22 test.

23 With respect to the instrumentation,
24 Halden had some very unique capabilities. They could
25 in-pile, in situ measure or provide data for thermal

1 conductivity degradation, which is very important in
2 understanding how well the fuel is able to transfer
3 its heat. And they had other capabilities, in-pile
4 crack growth. There's a host of these things that they
5 had developed and were using regularly which have been
6 not transferred outside the Halden reactor with such
7 ease.

8 I know, before I retired from INL and I
9 think it continues that there are efforts to try and
10 develop those capabilities, but it's not been
11 demonstrated that they have that yet at this time.
12 I know that the Jules Horowitz, which is being
13 constructed in France, was also trying to develop the
14 capability.

15 And I, again, I know people are trying to
16 do it, but it is a capability that's very important
17 when we think about the HALEU or the accident tolerant
18 fuel and you want to have high-burnup data. -- you
19 want to have that kind of data. You need to have
20 something like Halden.

21 So I do hope -- we have a meeting scheduled
22 in the next couple of months here to hear what the
23 staff's plans are to address that capability, and it
24 is an international problem. And I anticipate that
25 the staff will be giving their ideas on an international

1 solution to that problem.

2 Does that help?

3 CHAIRMAN SVINICKI: Yes, thank you.

4 That's very helpful. And I would just say, even though
5 my background is not really as an experimenter, I know
6 another benefit of the long-term access to something
7 like ATR or to Halden is the confidence one has in the
8 comparison.

9 Because basically you've gone back to the
10 same machine and you've run a different parameter or
11 something like that. The comparability over the course
12 of, for ATR or Halden over the course literally decades
13 really brings a certain pedigree to the research work.

14 So thank you for that.

15 And I'll just close with one comment that
16 was triggered by the interesting question of
17 Commissioner Wright, which had to do with the, as a
18 committee of experts spread across the country, what
19 elements of the virtual work would you like to carry
20 forward. I appreciate that certainly elements of doing
21 some remote gatherings would work well for you.

22 I think another potential benefit of
23 retaining some element of working in a distributed way,
24 if indeed you all have found that you can work that
25 way, is that as the committee approaches whatever its

1 next solicitation for membership might be, I think that
2 folks may be academics or researchers or those who are
3 tied maybe or cannot easily accommodate the need to
4 fly to Maryland ten times a year.

5 You may be able to get a more diverse set
6 of applicants. You could get diversity across
7 background and competencies and perhaps just diversity
8 in the very traditional sense. That may be -- so I
9 would just plant the seed of in your next solicitation
10 making explicit whatever these revised practices are
11 going to be, because you may have some wonderful
12 applicants that previously were put off by the need
13 to have all your meetings in person.

14 So I just note that as perhaps a potential
15 benefit to come out of all this. And with that, I will
16 turn over to Commissioner Baran.

17 COMMISSIONER BARAN: Thanks, Chairman.
18 Walter, thanks for your discussion of the NuScale design
19 certification review and the issues that ACRS flagged
20 there as areas of concern or ongoing work. I'd like
21 to ask about a few of those.

22 On the boron dilution issue, what would
23 the staff need to require at the combined license stage
24 to address that issue?

25 ACRS MEMBER KIRCHNER: Thank you,

1 Commissioner. Well, I think the consensus of the
2 Committee would be that we would like to see a much
3 more detailed analysis of, and I'm being a little bit
4 repetitive here, of my answer to Commissioner Wright,
5 that they explore the state of the system and the options
6 that are available. For example, I flagged in my
7 presentation the importance of the chemical volume
8 control system. That is the preferred option that the
9 applicant identified to recover.

10 Now, consider the fact that if that
11 system's not available, what is the backup approach?

12 And that likely would be to use the containment fill
13 and drain system. But the containment fill and drain
14 system is kind of an indirect way to get boron where
15 you want it. You're pushing on a rope, so to speak.

16 Whereas the CVCS system would extract from
17 the downcomer, inject into the riser, as well as spray
18 into the pressurizer. And that drainage from the
19 pressurizer would preferentially go to the downcomer.

20 So that's the kind of space that I think we feel needs
21 to be further explored. It is doable. It's not a
22 showstopper. But it certainly is a matter of concern.

23 And let me perhaps fall back on a little
24 history. I did cite a couple of agency-sponsored
25 contractor reports that are on my slides. The result

1 of the existing fleet looking at the boron dilution
2 issues for a small break LOCA led to among other things
3 the institution of administration concerns -- controls,
4 excuse me, at the plants.

5 And the one thing you don't want to do in
6 a situation like that with the existing fleet is restart
7 the reactor coolant pumps. So that's why I highlighted
8 previously our concern about can you get in a situation
9 where the equivalent here for the NuScale design would
10 be restoring natural circulation.

11 And so that is the space we feel that needs
12 to be explored more thoroughly. Once you've done that,
13 then you can look at the systems that are available
14 and identify the best path to recover the plant and
15 put it in a safe condition.

16 COMMISSIONER BARAN: Okay, thanks. You
17 also discussed another issue, which was the possibility
18 that the reactor could return to criticality after being
19 shut down if the most impactful control rod fails to
20 insert. The NRC staff concluded that the risk
21 associated with this event was negligible

22 Can you walk us through ACRS's view of
23 whether the risk is negligible?

24 ACRS MEMBER KIRCHNER: Well, the scenario
25 that they looked at was, actually I've touched on it,

1 they looked at the situation when the core is highly
2 borated. In neutronic terms, you would say it's black.

3 The boron concentration is much higher than it would
4 be under normal operation.

5 They looked at a scenario where you used
6 a containment fill and drain system. The water would
7 spill into the downcomer, and you would have a very
8 slow rate of entry of deborated water into the core.

9 Probably a good deal of mixing. And if in that
10 circumstance you did return to criticality, it would
11 likely be benign. Because the rest of the core is
12 essentially black and you wouldn't get any feedback
13 effects from the core.

14 So that would be a benign incident. I was
15 hinting at this when I said that sometimes when you
16 do a bounding calculation like that, maybe the answer
17 or the concern is in between. So, and what I mean by
18 that is so say you restore the level into the system,
19 the boron, it's -- you have deborated water but the
20 concentration isn't -- is sufficient still to retain
21 the core subcritical.

22 But then you get this rapid influx of
23 deborated water. Then that's a different scenario,
24 and we haven't seen that one analyzed. And the results
25 of that may also be benign. And again, going back to

1 the history, these same kinds of analyses were done
2 for the existing fleet, and they were able to
3 demonstrate whether or not it would result in core
4 damage or not. And the case was it would not.

5 COMMISSIONER BARAN: Okay. My
6 understanding is that ACRS members weren't unanimous
7 about whether this potential return to criticality is
8 ultimately acceptable. And I'm interested in hearing
9 the different views on that question.

10 And I know, Walter, if you want to kind
11 of present the discussions of, you know, is this
12 ultimately acceptable or not, or if folks just want
13 to chime in if they have kind of the different views
14 on that. I'm just interested in hearing the discussion
15 around.

16 ACRS MEMBER KIRCHNER: Well, I think I
17 should turn to, if I may, Commissioner Baran, may I
18 turn to my colleague Dr. Jose March-Leuba? He was our
19 lead on this particular focus area, and I would like
20 him to have an opportunity to present his views.

21 COMMISSIONER BARAN: Great, thanks.

22 ACRS MEMBER MARCH-LEUBA: Thank you, I
23 just turned my video on. There, it's coming. All
24 right. So I'll talk while -- there we are.

25 First, the question about the static

1 control rod and return to criticality which led to the
2 GDC 27 exemption is different than boron
3 redistribution. And I am of the agreement that
4 absolutely does not pose any safety significance
5 whatsoever. And our letter on the topic explains the
6 five different items why, so I won't bother you with
7 it. It's of no safety significance.

8 With respect to boron dilution, that's
9 completely different. Both the applicant and the staff
10 and even some of us when we talk keep trying to focus
11 on operator procedures that we will use to, in a nice
12 controlled way, recover the facility after they take
13 us to ECCS. That's not what I'm talking about.

14 What I'm talking about is once you are in
15 this condition where a lot of positive reactivity is
16 sitting in front of the core, you have -- the amount
17 of distilled water that you have in front of the core
18 is, at the worst case scenario, is 12 core volumes.
19 And all that water is eventually going to get into the
20 core. The question is how fast does it get in there,
21 does it have time to mix with all the boron that's in
22 there?

23 It's a very difficult problem, and
24 completely ignoring it by saying, surely it will mix,
25 why do I have to look at it, it's not very reassuring.

1 So the -- what I would expect that staff to do at the
2 COL review is, review from the applicant that they have
3 performed a systematic search for initiating events,
4 accidents, okay, like inadvertent actuations, like
5 operator errors, that could cause an accident.

6 So you have to look for those initiating
7 events and then analyze them and say this one doesn't
8 cause a problem, this one cause a problem. Because
9 when we were in the December of 2019 time frame with
10 the design as submitted, the position from the applicant
11 was there was no initiating event that could possibly
12 get that distilled water into the core.

13 When we looked into it, we found two. We
14 found two that actually were the natural progression
15 of the events. In the case of the small break LOCA
16 extremely worrisome transient. It would have been
17 possibly bad. And so I think we need to -- I'm not
18 saying that anything bad can happen to the core, I'm
19 saying that I don't see a systematic analysis to find
20 out if it can. And that needs to be performed.

21 And the reason we're suggesting to do it
22 at the COL stage is because all these initiating events
23 come from the balance of plan components, like CFD,
24 CVCS, which are not currently design. So at the COL
25 stage, we will know how many valves, how many pipes,

1 how many pumps, where are they located, what can go
2 wrong with them. Right now, we only have cartoons.
3 So it makes sense to delay this systematic search for
4 initiating events to that stage instead of now, because
5 we just don't have the information.

6 COMMISSIONER BARAN: That's helpful,
7 thank you very much. Thank you, Chairman.

8 CHAIRMAN SVINICKI: Well, again, on behalf
9 of the Commission, I want to thank all the members of
10 the ACRS for the presentations, for their hard work
11 throughout the course of the year, all of the letter
12 reports that they provided. And in the absence of any
13 of my colleagues seeking recognition, I think from our
14 commission to your committee, many happy holidays and
15 a happy new year. And perhaps we can enjoy your nice
16 potluck next time around.

17 All right, thank you all, and we are
18 adjourned.

19 (Whereupon, the above-entitled matter went
20 off the record at 11:48 a.m.)