

UNITED STATES NUCLEAR REGULATORY COMMISSION
MEETING WITH THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

WEDNESDAY

JUNE 9, 2010

The Commission convened at 9:25 a.m., the Honorable
Gregory B. Jaczko, Chairman, presiding

NUCLEAR REGULATORY COMMISSIONERS

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DR. MICHAEL T. RYAN

DR. DANA A. POWERS

DR. WILLIAM J. SHACK

P R O C E E D I N G S

CHAIRMAN JACZKO: Good afternoon, everyone. Today we will -- the Commission will meet with members of the Advisory Committee on Reactor Safeguards, to discuss several important issues, including fire protection, the safety research program, the containment accident pressure credit issue and the disposal of depleted uranium.

The Commission benefits greatly from the independent perspective and the diversity of technical expertise and professional experiences that the ACRS brings to bear on these and other issues.

The ACRS's outstanding work has always been extremely valuable to the Commission and has been further recognized by the President and Congress, with the appointment of Commissioner Apostolakis a former member and chairman of ACRS.

The Commission highly values ACRS's independent role within the agency. And I think -- and certainly today, in the meeting we have today we will highlight, I think, that independent role and the importance of that role and I think the value that the Commission places on that.

Before we begin, I want to take a moment to recognize Dr. Dana Powers, who will begin his fifth term on the ACRS, or he began his fifth term on the ACRS last week.

So you began your service at a time when you were at a very young age and have continued for some time.

DR. POWERS: Still quite young.

CHAIRMAN JACZKO: Still quite young. And I think you and I, we have the hairlines to prove it, too.

So on behalf of the Commission, we want to congratulate you and appreciate your past service and your continued commitment to this agency and, ultimately, to the American people.

And that, of course, goes for all the members of the ACRS, and your tremendous service. 5

So I would ask if I any of my fellow Commissioners would like to make any comments?

COMMISSIONER SVINICKI: Mr. Chairman, I would just like to associate myself with your remarks and say that in my view, the Commission just derives such benefit the ACRS's advisory role. Thank you.

COMMISSIONER APOSTOLAKIS: I'm very glad to be on this side of the table.

DR. POWERS: So are we.

CHAIRMAN JACZKO: Commissioner Magwood?

COMMISSIONER MAGWOOD: Just add my welcome and to thank you for your service. I look forward to your testimony today.

COMMISSIONER OSTENDORFF: Just to add that I appreciate your service. Also, I would also recognize the importance of the technical advisory role you play and how critical that is to us to have an independent set of technical experts looking at these tough issues. Thank you.

CHAIRMAN JACZKO: Well, I will turn it over to

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you.

DR. ABDEL-KHALIK: Thank you.

Good afternoon. I'm Said Abdel-Khalik, Chairman of ACRS. I'd like to begin by providing an overview of ACRS activities.

First slide, please. Since our last meeting with the Commission on December 4, 2009, we issued 16 reports covering the following topics:

Draft staff guidance for the use of containment accident pressure, status of rule-making for depleted uranium and other unique waste streams, Safety research program.

My colleague's, Bill Shack, Mike Ryan and Dana Powers will provide more details regarding these three topics later in the meeting.

Additionally, the Committee issued reports on license renewal application for Prairie Island Units 1 and 2, selected chapters of the Safety Evaluation Report with open items associated with the evolutionary power reactor design certification application, as well as

topical report on the applicability of GE methods to expanded operating domains, supplement for GNF-2 fuel, interim staff guidance on Digital I&C systems at fuel cycle facilities, compliance with 10 CFR 50.54(hh)(2) and 10 CFR 52.80(d), loss of large areas of the plant due to explosions or fires from a beyond-design basis event.

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We have also reviewed several regulatory guides on the following subjects: Instruments sensing lines, risk-informed, performance-based fire protection, assessment of beyond-design basis aircraft impacts, containment isolation provisions, terrestrial environmental studies and manual initiation of protective actions.

Additionally, we have reviewed two standard review plans dealing with fuel cycle facility license applications and spent fuel dry storage systems.

Next I would like to talk about solicitation of new members. We currently have two open positions on the committee.

Combined with an earlier solicitation, 8

which closed late last year, we have received 51 applications for those two positions.

The screening panel, consisting of ACRS Executive Director and a representative of the Office of General Counsel and a representative of the Office of the Secretary, has narrowed the list of applicants to 13 to be interviewed. One of whom has withdrawn.

Interviews of the remaining 12 candidates began last month, and we expect to complete the interviews in July.

New plant activities: We are currently reviewing design certification applications and safety evaluation reports with open items associated with a U.S. evolutionary power reactor and the U.S. advanced pressurized water reactor designs.

We are also reviewing design certification and final safety evaluation report associated with the Economic Simplified Boiling Water Reactor design.

We are reviewing amendments to the 9

Advanced Passive 1000 and the Advanced Boiling Water Reactor design control documents and are reviewing the reference combined license applications for the AP 1000, ABWR, ESBWR and USEPR designs.

So far, the Committee has been able to complete these reviews promptly, as the Staff complete their Safety Evaluation Reports.

License renewal: We have completed review of Prairie Island license renewal application. We've completed interim reviews of two applications, the Cooper and Duane Arnold stations and will perform interim reviews of five applications during calendar year 2010. These are Kewanee, Crystal River, Palo Verde, Hope Creek and Salem. And will perform final reviews of three applications in calendar year 2010; Cooper, Duane Arnold and Kewanee.

We will also review updates to the Generic Aging Lessons Learned report.

Power uprates: As will you hear later,

we have reviewed draft guidance for the use of containment accident pressure in determining available net positive suction head, and will review the Nine Mile Point and Point Beach extended power uprate applications which do not require containment accident pressure.

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Among the other ongoing and future activities are: Digital I&C, cyber security, safety culture, risk metrics for new reactors, state-of-the-art reactor consequence analysis, GSI 191, 10 CFR 50.46(a) and 10 CFR 50.46(b).

Radiation protection and materials issues. I would like to note that all ACNW&M activities have now be fully integrated within the ACRS. And finally, MOX fuel fabrication facility.

At this time, that concludes my presentation and I will yield the balance of my time to my colleague, John Stetkar.

MR. STETKAR: Thank you.

I'm John Stetkar: This afternoon I would just like to give you a brief overview of our work on reviewing Regulatory Guide

1.205 for risk-informed performance-based fire protection.

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As you are aware, in 2004, the Commission approved a new Subsection C to 10 CFR 50.48, which approved licensee's adoption, on a voluntary basis, of a performance-based fire protection plan that meets the requirements of National Fire Protection Association Standard 805; 2001 edition of that standard.

This voluntary risk-informed, performance-based fire protection plan is an alternative to the traditional deterministic fire protection plans and the plant-specific fire protection license conditions that are controlled under 10 CFR 50.48 Subsection (b).

Next slide. As a background to some of the Commission members who may not be quite as familiar with the history of this, I thought I might mention that in parallel to Reg Guide 1.205, there is a companion Regulatory Guide, 1.189, that was also issued as a new revision last year.

Reg Guide 1.189 provides guidance for

plants that desire to retain the deterministic type fire protection programs. It applies to both operating and new reactors. It's important to note that it applies to new reactors because, at the current time, all of the new design centers have adopted this basis for their fire protection plans.

None of the new designs are going to -- at least as part -- through the COL stages, are not going for a risk-informed performance-based plan. So this is an important Reg Guide for going forward with the new plant designs.

Reg Guide 1.189, in its current form, provides better definitions of the concepts of systems that are required for both safe shutdown, which are required to be protected by passive-type fire protection features, and systems or trains of equipment that are deemed to be important to safety, which are allowed to use a performance-based type -- not risk-informed, but performance-based type fire protection plan.

It also provides additional guidance for the

evaluation of fire-induced multiple spurious
actuations.

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Next slide.

A little bit of information about Regulatory
Guide 1.205. The regulatory guidance basically
endorses Nuclear Energy Institute guidance in NEI
04-02 revision 2, with some clarifications and
exceptions.

The next slide will talk about NEI
04-02.

The clarifications and exceptions
primarily are in programmatic issues. Technical
areas where Reg Guide 1.205 differs a bit from NEI
04-02 is in the application of specific types of
engineering equivalency evaluations that are not
probabilistic in nature and in the evaluation of
operator recovery actions, which I will speak
about in a couple of slides here.

Next slide.

NEI 04-02, here's the citation, provides
guidance to applicants for the entire transition
process from their current fire protection plan to

one derived from NFPA-805. The bulk of NEI 04-02

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covers problematic changes, administrative requirements, submittals, timing; those type of things.

It does, however, also include specific analysis guidance for the types of evaluations that should be performed to support the risk-informed basis.

Next slide.

It's worth mentioning two other citations. These are not explicitly endorsed by Reg Guide 1.205, but they are referenced as important inputs to the risk-informed evaluation.

One is NUREG CR-6850, which provides an overall methodological framework for performing risk-based -- risk-informed, I'm going to be careful, fire analyses.

And NEI 00-01, in particular, the sections of that document that provide guidance for evaluation of multiple spurious actuations that can be caused by fires. It's an important technical issue. It's a very difficult issue.

and NEI 00-01 provides rather detailed guidance in that area.

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Next slide.

Regarding our review of Reg Guide 1.205, we were pretty heavily involved with this last year. We had three subcommittee meetings and it came before the full committee finally in December, I believe. So we had quite a bit of involvement with the Staff. An active discussion, let's call it.

Some of the items that we particularly had input to were the criteria for selection of deterministic versus probabilistic analyses on a fire-area by fire-area basis.

The definitions of manual actions, recovery actions and the treatment of previously-approved operator actions during the transition from the current fire protection program to the risk-informed program.

As you're probably aware, many plants have been granted interim exemptions from fire protection guidelines based, not entirely, but

strongly accounting for credit for local manual recovery actions; locally going out in the plant, repositioning valves, aligning other alternate systems to cope with the effects from a fire.

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And it's very important for the Reg Guide to specify how those recovery actions are treated if an applicant wants to retain credit for them going forward after the transition. We had quite a bit of discussion in that area.

The third bullet on this slide may seem rather innocuous. It's the definition of what's called a primary control station. It's involved with the issue of recovery actions because, according to the guidance, an action is a recovery action if it's not performed at the primary control station. So determining what is a recovery action, it's important to know what is a primary control station.

We had quite a bit of discussion in that area.

Next slide.

Additional topics that we had

discussions about are the evaluation of multiple fire-induced spurious actuations, which we spoke about, and the application of the guidance in Regulatory Guide 1.174, to the change in risk during the transition process, and how that guidance was applied after the transition to NFPA-805.

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Next slide.

The Staff was very responsive. We had an excellent interchange on this. We feel that the final version of the Reg Guide, as it was issued, is now very clear on how all of these issues should be treated. And we are very, very happy with that process.

And finally, I'd like to note that we've also had a briefing from the two pilot plants, Shearon Harris and Oconee, who are in process, actually, right now, of implementing, on a pilot basis, NFPA-805 and this risk-informed framework.

It was a very interesting presentation. We have not reviewed anything from them. I understand that Shearon Harris has at least

submitted their license amendment. And that's --
the Staff is working on that now. We have not yet
been involved in that.

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But it's important for us to understand,
from a technical perspective, what actual problems
on a practical sense people who are trying to do
this were having. And we feel that those pilot
applications are going to be very, very beneficial
to both the industry having an actual
understanding of the practical sense of how one
does this, and as a practical matter from the
Staff.

Thank you.

DR. ABDEL-KHALIK: Dr. Powers?

DR. POWERS: I'm going to discuss with you the
NRC's review of the Reactor Safety Research
Program.

May I have the first slide, please.

I think most of you are aware that we review
research in a variety of ways. We certainly look
at research when it is supporting some particular
regulatory program.

We also conduct in-depth quality reviews of particular research programs; in fact, have two of them underway.

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Today I'm going to focus on our overall programmatic review of the research program.

On the next slide I show you the 15 elements of the research program that we reviewed.

I caution you that these elements -- the research programs are broken down more according to the structure of the ACRS than the way they're organized in Research. Research organizes its own research programs in a much more multi-disciplinary fashion.

The general observation on the research program: It is working extremely well. I have never seen such a productive research program going on in the years that I have been involved in examining NRC's research.

The line organizations are exceptionally supportive.

It is not uncommon in our review of a particular research activity to have someone from

the line organization show up and explain why he is supporting the research and why he's enthusiastic about the research.

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In that respect, I have never seen researchers so enthusiastic about the work they're doing. It is not uncommon for research programs to approach the ACRS and say they would like to come before us and strut their stuff. And you don't do that if you don't have stuff to strut.

The other element of the research that is remarkable is it is reaching out to the larger technical community.

We do not have a problem of NRC research becoming isolated and inbred. And, in fact, they're reaching out the larger international community. And that mean that the research is exceptionally well planned and documented, in order to reach out to the larger technical community.

On a personal view, I attribute this to exceptional research management and the discipline that they're imposing on the research program.

think are worthy of note, simply because we've commented on them to the Commission in the past. Our report does address each one of the areas, but I did want to note that the TRACE code for thermal hydraulics is indeed becoming integrated into the regulatory process. It has undergone some extensive peer review. It does become one of the tools available to the Staff for the analysis of design-basis nuclear accidents.

There is substantial progress in the work on quantitative analysis of human reliability. The Commission has asked particularly about that area and how we distill from all the various human reliability models those that are most suitable for particular applications. That is progressing well.

The seismic research program is amazingly revitalized. This is particularly significant now that we're moving to the next generation of light water reactor plants, where seismic is very likely to be the safety-limiting

accident initiator in these plants.

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You have just heard a presentation on the NFPA-805, you also have a fire research program that is making a major step toward integrating together both experiments and modeling that will be necessary to carry out NFPA-805, which requires that there be validated models used in the analyses.

And, finally, I wanted it noted that the steam generator action plan initiated so many years ago in response to the change in the nature of degradation of steam generator tubes, we have completed that action plan. That does not mean the research on steam generator tubes is at an end, it means that that research has now been integrated into the overall research program and not a standalone activity by itself.

There are needs for research. There's more need for research than you have researchers or budget. But some areas that we've particularly noted for need first involves PRA.

The agency is becoming a risk-informed regulatory body. That means it requires

probabilistic risk assessments. The agency has developed many of those methods and, over the last few years, has been taking the methods and integrating them into the regulatory process.

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It's now the look at how those methods can be advanced. And there are opportunities for going to a next generation of probabilistic risk assessment. My own feeling, of course, are that metrics -- importance metrics are particularly in need of improvement, because they figure so prominently in the regulatory process, through inspections and significance determination processes.

There is another area where the NRC has been pioneering, and that is both the uncertainty analysis and the use of expert elicitations -- expert opinion elicitations.

I stand corrected, sir.

The agency has pioneered many of these methods over the last two decades, but still we have the problem that there's not a common approach in the various technical activities in

either in certainly analysis or the use of

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expert opinion elicitation. And we had the opportunity to do that, and should.

One area that is particularly important to the agency is that we have an aging fleet of nuclear plants and we are having materials degradation.

We are continuing to have surprises in the areas of material degradation up here. And in response to that, the research program initiated what they call the proactive materials degradation assessment, which was an effort to try to identify where we could anticipate materials degradation that would affect plant performance appearing in the future.

We have become concerned that that initiative that was begun with great energy has lost some of its momentum.

The Staff assures us that that is not correct. That, in fact, it is progressing, and that we have simply entered an area of lull that's likely to occur in any major initiative.

But it clearly is an area we will be

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paying continued attention to, because it figures prominently in issues such as life beyond 60.

Finally, I wanted to note that the agency lives on having risk information for a risk-informed regulatory process. Much of that risk information comes from the NUREG 1150 analysis of five representative plants.

That particular assessment is now almost two decades old. It is, perhaps, time to redo that initiative.

The ACRS is supportive of the idea of redoing that, but we caution that it's an expensive, time-consuming activity that ought to be very well planned before it is initiated.

It is not an activity that can be done on the cuff and still yield useful results for the agency.

There are some issues on the horizon that the research program needs to pay attention to.

One of those is a DOE initiative to

apply high fidelity computer simulation to existing nuclear power plants, these are simulations that would use on the order of 3,000 processing units and integrate the atomic scale, the meso scale, the macro scale-type modeling of nuclear power plant issues.

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This is something we've never seen before in the regulatory process, and it's not clear how massive parallel, high fidelity modeling would in fact interface with the regulatory process.

Another issue on the horizon, of course, is the gas cooled reactor. And I will comment that we found the research program that NRC had defined for the gas cooled reactor to be impressive.

They are responsible, of course, for developing the computational tools for the licensing. And, of course, it will be important to see how those computational tools gain the data they need to be validated.

Finally, I will note that reactor fuel

processing is on the horizon. And this is an area where the research program may have to move to understand better what the safety issues are with fuel reprocessing.

We do issue in the report a caution.

There's a continued degradation of the capability to do new experimental nuclear safety research in the United States. That's true not only for the agency, but also for people designing nuclear reactors. Test reactors and hot cells are particularly limiting.

Now, the research programs at NRC are compensating for this degradation by establishing collaborations with other countries where the facilities still exist and capabilities are still available.

One of the problems that this degradation poses is that NRC needs to consider, when reviewing results of ever more complex computer code calculations, when it is essential that they see experimental validation of those calculations.

Finally, in our report we did look at 28

the issue of extending licenses beyond 60 years.

The research now is focused on what we understand to be relatively well-known areas of vulnerability. That's the integrity of the vessel as it undergoes continued neutron irradiation and the loss of ductility; the ability to have surveillance specimens to indicate what degradation and ductility has occurred, the aging of electrical cable insulation and buried pipe that's not accessible for ready examination.

These are fairly well-established areas of vulnerability. We are certainly hoping that an active proactive materials degradation program can identify for us if there are any other heretofore unknown areas that need to be considered as we contemplate the idea of granting licenses that extend plant operation beyond 60 years.

And that concludes what I had to say.

Thank you.

DR. ABDEL-KHALIK Next, Dr. Shack.

DR. SHACK: I'm back again to discuss the

issue of containment accident pressure and its effect on net positive suction head calculations.

This issue has been an issue that's been discussed between the ACRS and the Staff for several years now. And, in fact, I'm going to be recycling a few viewgraphs, so some of this will be déjà view for a few of you.

Next slide. That's fine.

Since 1970, the NRC regulatory position has been that emergency core cooling systems should be designed so you have adequate NPSH provided to the system pumps, assuming no increase in containment pressure from the accident.

Although, we realize that in most cases there actually will be an increase in containment pressure. And most reactors in operation meet this position.

Next slide.

It's an important element in defense in-depth and safety margin to maintain this independence.

We don't want the ECCS function to depend on containment integrity so that an

unexpected loss of containment integrity or

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strainer blockage would not lead automatically to core melt.

Next slide, please.

This becomes particularly challenged in extended power-up rates. For some plants, demonstrating adequate NPSH for extended power uprates of operation requires credit for essentially all the predicted containment accident pressure.

It may require reliance on operator actions to maintain the containment accident pressure and maintain NPSH, and reliance on CAP credit for long durations.

Next slide.

In some cases you have pump cavitation is expected even after crediting all the predicted accident pressure.

Next slide.

The ACRS position on containment accident pressure credit, I think we outlined fairly well in our letter last year of March 18, 2009, and I'd just like to reiterate some of those

positions, that we should seek to maintain this independence of the containment function and the accident mitigation and the additional margin that we have in NPSH that is provided by not relying on containment accident pressure.

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We think that licensees should be required to demonstrate that it is not practical to reduce or eliminate the need for overpressure credit by hardware changes or requalification of equipment before we consider granting credit.

And we believe this justification should be made on a plant-by-plant basis. The licensee knows his plant best, has the most inside knowledge of what changes might be possible in order to reduce this kind of mitigation.

In that letter we also set up a criteria for the acceptance of CAP credit, that when we do the deterministic calculation, conservative calculations of CAP credit for design basis accidents, the required CAP credit should be short and the amount of credit should be small.

In that letter we didn't try to define

what short and small meant. We kind of left that undefined.

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If hardware modifications are impractical, we think that the defense-in-depth margins that are involved in allowing CAP credit should be relaxed only if the associated increase in risk is small.

In our March 2009 letter we noted that the PRA could be used not only to assess the risk, but also to assess -- help assess the impact of CAP credit on defense-in-depth.

If the risk associated with the CAP credit is low, it could be because CAP credit really isn't very important to safety or it could be that the likelihood of losing CAP credit is very small or at least is assumed to be very small in the PRA analysis.

In our 2009 letter we suggested using the PRA to study the sequences in which CAP credit is needed. In PRA terms, we wanted a risk achievement worth for CAP credit. That would be the ratio of the risk that we would have if we

always lost CAP credit, versus the risk that we have when we think that CAP system is as reliable as assumed in the PRA.

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This calculation provides insight into the defense-in-depth question that we always raise; what if we're wrong about that assumed reliability of the CAP integrity?

The Staff has developed an estimate of the risk achievement worth for CAP, and the value is 750.

So this is probably a conservative estimate, but it is the best we have at present.

Thus, if we are wrong about the reliability of maintaining CAP pressure, we could have a very large increase in risk.

In the Staff risk study, the probability that a leak exists before the accident initiates is about one times ten to the minus five.

The probability the leak develops after the accident initiates is also about one times ten to the minus five. That is the modeling assumed

in the PRA says that the likelihood of losing your integrity during an accident is about the same as the probability of a leak developing during a week of normal operation.

The large potential increase in risk suggests that we need to carefully consider the bases for these low-failure probabilities.

In our letter we noted the Staff assessment considers only internal events, and that the risk from fire and seismic events also need to be considered.

However, even in terms of internal events, the Staff assessment does not consider the possibility of errors associated with the operator actions that many EPU plants will undertake.

And again, in a generic study such as the Staff has done, you really can't do that. Those procedures will be plant specific and will have to be dealt with on a plant-specific basis.

The model for preexisting -- the probability of preexisting leakage under normal operating conditions has a substantial empirical

basis.

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I mean, we've been running plants, we've known -- we've run integrated pressure leak tests. We can monitor oxygen in BWRs. So there's a substantial empirical basis for that.

The model for leakage during the accident essentially assumes that the failure rate is the same as it is in normal operation, and we simply calculate the duration of the accident and compute the failure.

The basis for this, presumably, is that the elastomeric seals used in the penetrations are qualified for the pressure temperature and radiation conditions encountered during an accident.

However, these qualification tests are not completely prototypical. We certainly haven't run large numbers of them. And it's difficult to equate margin in a qualification test to a probability of failure.

With 100-plus penetrations in the containment, the one times ten to the minus five

probability equates to a failure probably of one times ten to the minus seven for an individual penetration.

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It's difficult to quantify the uncertainty in these estimates, but certainly should be recognized that they exist.

In our most recent letter on CAP credit, we -- again, it only addresses the voluntary requests for changes in licensing basis.

We maintained our position that licensees should first demonstrate that it's impractical to make plant modifications that eliminate the need. And again, we believe that a plant-specific demonstration is necessary.

Now, in the draft guidance that we're reviewing from the Staff, the draft guidance that we received at the subcommittee meeting did contain a requirement that the licensees do this justification.

However, the Staff presented an alternative version of the guidance at the full committee meeting, where based on their risk

assessment, they concluded that for Mark One BWR containments, you could have a blanket approval and no plant-specific demonstration was necessary.

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We disagree with that.

The Staff draft guidance provides an improved framework for the assessment of CAP credit. It, however, is focused on the deterministic analysis of licensing basis events.

Again, they've done the generic PRA, considering only internal events, no operator actions.

We feel that needs to be complemented by plant-specific PRAs if CAP credit is requested.

We're supporting their reassessment of the potential problems of operation of pumps with low NPSH. They did go out and look for that. And, again, that's to be commended.

Again, another position in our recent letter is that even if the conservative design basis LOCA analysis shows some need for containment accident pressure credit, if no containment pressure credit is needed for the

base analyses, and if you did a more realistic analysis of the LOCAs with consideration of uncertainty so that you did the sort of typical 95/95 statistical lower bound for the LOCA analyses, and you showed you needed no CAP credit for that, then the CAP credit would be small enough to be acceptable without consideration of modifications or a full PRA analysis.

However, I would note that you're still getting a decrease in margin when you do that. And again, as you read the added comments in our letter, a number of my colleagues disagree with this position, and they would ask for consideration of modifications or a PRA, even in this case.

Now, again, the Staff PRAs provide important insights. We have -- and include order of magnitude estimate of seismic risk. However, there's no estimate of fire risk or the risk associated with operator actions.

We need plant-specific PRAs to address

this.

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One issue that arises is the Staff is reluctant to request plant-specific PRA information for nonrisk-informed applications, like extended power uprates.

And again, there's guidance in the standard review plan for when they can ask for risk information for an application that is not risk-informed and the Staff feels that the CAP credit does not meet the threshold for that request.

I should mention that this shouldn't be taken to mean that the Staff agrees with our request that plant-specific PRAs are needed and it's only a legal problem in requesting that information, but it's their first line of defense.

Again, the ACRS position is that since CAP credit challenges the defense-in-depth principle of independence of barriers and a 40-year-old regulatory position, it's a special circumstance that warrants the request for risk

information that we're looking for on a
plant-by-plant basis.

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Conclusion: Our May 19, 2010 letter is
consistent with our long-standing ACRS positions.

We tried to give a more specific
criterion for the small and short that we
introduced in previous ACRS letters.

We believe it's consistent with the NRC
defense-in-depth philosophy that says your need
for defense-in-depth is associated with your
uncertainty in the risk.

And again, this is -- we feel, at least,
apparently on the basis that we've seen so far, a
risk-important consideration that involves
substantial uncertainty and, therefore, warrants
considerable in-depth investigation of the defense
in-depth.

DR. ABDEL-KHALIK: Thank you, Dr. Shack.

Next, Dr. Ryan.

DR. RYAN: Good afternoon, gentlemen and
Commissioners.

I'm with you today to provide information about
the Committee's work on depleted uranium.

In October of 2005, the Commission directed the Staff to consider whether the depleted uranium and wastes from uranium enrichment facilities warranted amending 10 CFR 61.55(a)(6), which provides guidance on waste classification in the context of near surface disposal, and table 61.55(a) which provides the details for specific radionuclide concentration limits in various classes of waste, A, B and C.

Next slide, please.

In 2009, the Staff held workshops in Maryland and Utah to inform the public and receive input regarding the rulemaking and related technical issues. I was pleased to attend the Washington workshop.

The Staff is currently developing interim guidance based in part on this information gathered.

The Staff is prepared to respond, as well, to the technical assistance requests that may occur from Agreement States on this topic.

Next slide, please.

Committee recommended that Staff guidance should focus on key factors for risk-informed analysis that include characteristics of waste and waste form, radionuclide quantity. And that is content and total quantity, rather than just concentration, and site-specific features of geology, geochemistry, hydrology, climate conditions, including weather and near surface soil and water interactions, depth of disposal and cover technologies used to isolate waste from the geohydrologic system.

Next slide.

Additionally, the Committee recommended that the proximity of potential -- of waste facilities to potentially expose members of the public should reflect site-specific conditions not prescribe bounding conditions. It should be treated in a risk-informed and probabilistic fashion.

Scenarios used to estimate dose to the public, should also be based on realistic assumptions, including exposure scenarios and

conditions of exposure.

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Next slide, please.

The dose and uncertainties is the doses to members of the public and future residents at disposal sites should be estimated over a timeframe for specific sites on a case-by-case basis.

For example, if depth of burial is very deep, then the time for performance might be longer than if it's very shallow. That's just one example of that kind of thinking.

This timeframe should take into account the specifics about the materials, the methods of disposal and the site and performance assessment factors I mentioned earlier.

Next slide, please.

The two key points regarding guidance that would be helpful to applicants for waste disposal include the standards by which applications will be reviewed, particularly with regard to the structure and content of facility performance assessments. These requirements

should be clearly articulated.

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The expectations for data supporting waste disposal requests and the quantification of uncertainty should also be provided in guidance.

An example, in my opinion, of two success stories in this area are the waste determinations that were completed for waste disposal activities at the Savannah River plant and the Idaho National Laboratory.

Next slide.

The Staff should continue their efforts to risk-inform the regulation for the disposal of depleted uranium based on site-specific realistic performance assessments. Appropriate consideration should be given to the evaluation and treatment of uncertainties.

And with that, I thank you for your attention.

DR. ABDEL-KHALIK: Thank you, Dr. Ryan. This concludes our presentation.

CHAIRMAN JACZKO: Thank you for the presentations. We'll start questions and comments with Commissioner

COMMISSIONER SVINICKI: Thank you. Thank you all for the presentations.

Dr. Ryan, before your microphone gets too cold, maybe I'll start with you.

We heard that the activities of the Advisory Committee on Nuclear Waste and Materials have now been fully integrated into the ACRS framework.

We're, I think, about two years out from the abolishment of the ACNW&M.

In your view, is it working, have we lost anything? And does the ACRS, the expertise represented there, sufficiently encompass the issues that are being addressed beyond just your long involvement in the ACNW&M.

DR. RYAN: Yes, I think it's worked very well.

I wouldn't say the ACNW&M was abolished, it actually was absorbed. It's alive and well, but under the banner of ACRS.

I'm proud to say that --

COMMISSIONER SVINICKI: But it's a little

lonely for you.

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DR. RYAN: Actually, on some of these key waste issues, I have to admit, yes, I sometimes feel like I'm teaching a new dictionary to my colleagues. But that's okay, because I'm learning a lot and I get a lot of benefit from the fact they have expertise in areas that are related to waste and some have actually volunteered to join in the waste issue. So I'd say it's collegial and productive and has worked very, very well. So thank you for asking.

COMMISSIONER SVINICKI: Okay, thank you. And I think, as I understood it, that was clearly the objective was to take the broad experience of the ACRS members and apply it to these issues. So I'm please to hear that in your view it's working as intended.

I'd like to touch just briefly on -- I know the reviews related to new reactors weren't specifically a topic today, and we heard a little bit of an overview Said of how that's coming along.

But at a previous meeting between the Commission and the ACRS, I had noted in a letter report I think related to the ESBWR chapter-by-chapter review, that the chair there, I think it might have been Dr. Corradini had expressed some concerns about the natural constraints of operating under the necessity of doing chapter-by-chapter reviews.

And I'm also kind of struck by how the ACRS has had to be, I think, agile and adaptable, in terms of the design certification reviews, and adjusting a workload and maybe moving some things up and some things back.

Is there anything -- I think I haven't engaged with the ACRS for a couple of meetings now on this topic?

You said that the work's getting done. Is there anything you'd like to add, though, in terms of needing to plan ahead and restructure and re-sequence work, depending on how the NRC technical staff is doing and pacing their reviews? Or, for instance, the AP 1000, if issues arise

there and you've got to look and re-sequence; is that -- are you comfortably able do that or you're managing your way through and you're kind of at peak capacity here? How would you react to that.

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DR. ABDEL-KHALIK: I think we are comfortable in what we're doing. We have communicated with the Staff regarding the possible modification of the chapter-by-chapter nature of the review and making it more issue-centered review.

And that has worked very well in the more recent reviews that we have conducted with regard to the ABWR, for example.

So I think the process is working. We are managing the load. But I think we're very close to our peak capacity.

COMMISSIONER SVINICKI: Okay. I appreciate that. Early in my career -- and this is in the context of 10 CFR part 71 Reviews of Transportation Packaging. Someone said to me, you know, there is a limited ability at times to segregate out these reviews. It would be for transportation packaging as if someone said to

you, what do you -- do you like this lid? And if
you give me your answer on the this lid, then I'll
give you the rest of the design of the package.

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And that was a good imagery for me,
because when you're assessing the system behavior,
I think it's difficult to -- there's some sort of
limit to hear to how much we can kind of piece the
reviews up -- but, again, you're telling me
it's something to keep an eye on, but you're
working -- you're taking those kind of natural
constraints and working through them?

DR. ABDEL-KHALIK: I think I made that point before,
that the strength of ACRS reviews perhaps sort of
rest on the fact that we do not have a standard
review plan. And, therefore, by definition, our
reviews are integrative in nature. They bring
into play a wide range of expertise in an
integrated fashion that covers, most importantly,
the interfaces between disciplines.

And, therefore, we are able to provide
an integrated review without having things fall
between the cracks when we do these issue-centered

reviews or chapter-by-chapter reviews.

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COMMISSIONER SVINICKI: And I agree with you precisely that I think that is the key benefit here. And so I want to make certain that the way we're structuring the reviews somewhat around the schedule constraints is not in any way jeopardizing the natural advantage that you just pointed out, of the nature of ACRS reviews.

So it sounds like you're not cautioning me at this time that that's a concern.

DR. ABDEL-KHALIK: That is correct.

COMMISSIONER SVINICKI: Okay. Thank you.

DR. POWERS: I think it's also worthwhile giving credit to the Staff on their discipline that they're exercising on when they bring a chapter to us, that they really aren't bringing them to us unless they feel like the issues that remain outstanding are inherently resolvable.

And that's certainly helped a lot in the EPR review, that they are imposing a discipline on themselves. It's very helpful to us.

COMMISSIONER SVINICKI: Okay, thank you.

appreciated the update on that.

I would like you to react to a concern that I've heard raised in just a very kind of vague and general sense. But, it's this characterization that the Staff's approach to the NFPA-805 pilot, the reviews of those pilots, may be that it's kind of a deterministic PRA, meaning that it is a PRA approach that clings to all the deterministic conservatisms of the past.

How would you react to that concern that that may be what's happening here?

MR. STETKAR: Well, I think first recognizing we haven't really had the benefit of seeing any of the Staff's reaction to the current license application from Shearon Harris, so we as a committee don't have the benefit of actually having any experience in that process. So it's a bit premature to comment on your concerns relative to, if you characterize it as a deterministic probabilistic approach or something -- I'm not quite sure what that actually entails at the

moment.

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So I think it's a bit premature to comment on that because we really don't --

COMMISSIONER SVINICKI: Okay. So in terms of your engagement with the staff and hearing from --

MR. STETKAR: We haven't engaged at all.

COMMISSIONER SVINICKI: -- the pilot sites, it's not something that's emerged yet for you as a concern?

MR. STETKAR: Not yet at all. Our only briefing from the pilot projects was simply, we asked them to come in because we had heard concerns from both the industry and the Staff regarding the level of effort that was required, technical issues that people were struggling with. In particular, the evaluations of fire-induced hot shorts, the amount of effort that was required to do those analyses, how realistic and productive that whole process might be.

And our presentation last year from both the pilot projects focused more in that area. In other words, the actual analyses that were

undergoing -- that were being undertaken at that time.

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To be quite honest, it was a good confidence builder. We actually had pretty good feedback from both of those pilot projects, that they felt the work they were doing was productive. They didn't feel it was an undue burden. Which, honestly, was a bit surprising.

As far as the product and the review -- the Staff review of that product and what is actually there, we have had no interaction yet. I'm assuming we will hear about that.

COMMISSIONER SVINICKI: Okay. I look forward to continuing to hear about the ACRS's engagement with those pilots and a review of the activities there.

Dr. Shack, I would just like to clarify a couple of points in your presentation.

Between slides 42 and 43, should I understand from slide 43 that when you say "if special services exist, that would warrant a request for risk information," is the term "risk

information" meant to refer to the site-specific

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PRA on slide 42?

DR. SHACK: Site-specific PRA, where we're looking both at the risk and essentially what we call the risk-achievement worth or the CAP credit --

COMMISSIONER SVINICKI: Okay. But it would take the shape of the site-specific? Okay, thank you. I wanted to make sure that those were equivalent.

And then on your slide 39 you talk about a demonstration that it's impractical to make plant modifications.

What would be the metric for impracticality?

DR. SHACK: There's only so much the ACRS can agree on in one meeting.

COMMISSIONER SVINICKI: Is it impractical to ask for a definition of impracticality?

DR. SHACK: That's -- because that involves a number of, perhaps, regulatory issues I'd prefer not to comment on that at the moment.

COMMISSIONER SVINICKI: Okay. Well, the red

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light was your friend. My time is up, Mr.

Chairman.

CHAIRMAN JACZKO: Commissioner Apostolakis.

COMMISSIONER APOSTOLAKIS: Thank you, Mr.

Chairman.

Let me pick up on a comment that Commissioner Svinicki made. Fire. It's not just that the NUREG-6850 is characterized as a deterministic probabilistic PRA, but I've heard people say that they don't want to use the NUREG-6850 methodology, because they want to use fire PRA, which astonishes me. And then they elaborate and say 6850 is not a fire PRA.

It uses methods that could be called probabilistic to demonstrate that NFPA-805 requirements are met and there are a lot of conservatisms and so on.

So if there exists a dichotomy where a lot of experienced risk analysts don't think that 6850 is a fire PRA, that is really something that bothers me a lot.

But then John Stetkar mentioned that,

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you know, the presentations, people said that there were no problems and so on.

Unfortunately, when you talk to people informally, they tell you there are a lot of problems.

So -- and there seems to be a consensus that the regulations were ahead of the methodology in that context. And I, for one, would like an independent body like the ACRS to come and tell us what the real issues are, and maybe offer some recommendations to the Commission as to what would be the way to proceed and resolve those issues, because we don't want to repeat the same mistakes in the future.

But also, I hear things like, you know, this fire protection thing is consuming all the resources of the licensees, nobody has time to do anything else. Then I talk to Staff and they say, well, gee, they had four years and they haven't done it.

So I would really like to have something

like that. I know you cannot promise anything,
but I'm just saying that for my colleagues here.

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DR. POWERS: Professor Apostolakis.

COMMISSIONER APOSTOLAKIS: Yes, sir.

DR. POWERS: I think it's worth the Commission remembering that it took the licensees over ten years to get to the point they were comfortable within their own organization implementing Appendix R.

It takes a long time to get familiar with these things. And it was a very substantial investment by licensees to get to that point.

COMMISSIONER APOSTOLAKIS: I fully understand that, but I also hear that there are problems with the actual methods, and I --

DR. POWERS: You know there are.

COMMISSIONER APOSTOLAKIS: I hear conflicting views.

MR. STETKAR: I think also -- that's why I think the pilot projects are so important because, quite honestly, there is not the same experience base

doing probabilistic analysis of fires.

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People believe that, well, I have an internal events PRA, I have the basic models of the plant, all I need to do is ignite a fire in a room and see what happens, in a very simplistic sense.

It's a very, very complex process. It's a process where the methods, I believe, are well-founded to provide confidence on how large the risk from fire is not.

The methods are not as well-developed, and the experience base is certainly not as well-developed to provide a precise estimate for how low the risk is.

And I think that's a bit of the issue with people struggling with the amount of effort that's required. Many people want to very precisely estimate the risk from fires and put it in the same context with the risk from the internal events models that they have. And that's a very, very difficult process.

COMMISSIONER APOSTOLAKIS: And I appreciate

that.

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MR. STETKAR: And I believe that requires precision.

COMMISSIONER APOSTOLAKIS: I appreciate that, but at the same time I hear more practical and pedestrian objections. And, you know, we are applying 6850 and we get very unrealistic results. You know, that kind of thing.

So I would like to see that evaluation, if possible.

DR. ABDEL-KHALIK: The Committee stands ready to respond to any request the Commission might have.

COMMISSIONER APOSTOLAKIS: As it always has. I -- by the way, one thing, for example, the pilots say they have no problems. And then you talk to people and they say, of course Shearon Harris doesn't have any problems, they already spent 30 million fixing the damn thing. So, Dr. Shack?

DR. SHACK: Yes, Commissioner?

COMMISSIONER APOSTOLAKIS: We have to reach a point where you will not recycle your viewgraphs.

And in order to do that, I, for one, would need to understand what are the two or three most major disagreements between the Committee and the Staff So that maybe we can focus on them and take some action.

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So could you please give us those two or three major points?

I mean, you know, I can try to find out myself, but I would rather have you tell me.

DR. SHACK: I think, you know, the one is that we want, essentially, a plant-specific justification from the licensees that hardware changes to eliminate the need for CAP credit are impractical.

COMMISSIONER APOSTOLAKIS: Okay.

DR. SHACK: If that turns out to be the case, we want, essentially, a plant-specific PRA demonstration that the risk from CAP credit and its implications for defense-in-depth -- or at least, PRA assessment of that, then, we can go through an integrated judgment process as to whether that is acceptable or not.

But it's having that PRA information,

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the risk and, essentially, the defense-in-depth implications, and the fact that we want plant-specific justifications for the impracticality of hardware changes that I think are the big issues between us and the Staff.

COMMISSIONER APOSTOLAKIS: And in answering the second point, of course -- we'll come back to Commissioner Svinicki's question to have a better definition or better description as to what is practical or impractical, correct?

DR. SHACK: Yes.

COMMISSIONER APOSTOLAKIS: I mean, the Committee will not be asked to define it, so the Staff might do that.

DR. SHACK: We view that as the Staff's prerogative to define impractical.

COMMISSIONER APOSTOLAKIS: Okay. Now, why, of course, somebody, just because it's practical, would be asked to spend money, modify the plant, and somebody else -- the plant is declared as impractical to modify, would get away with

analysis is something that I'm trying to understand, but maybe there is something there that I don't understand.

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I think we really need the definition of practicality, because it seems to me you have two groups here, when it's impractical, they can go on and do analysis.

DR. SHACK: Well --

COMMISSIONER APOSTOLAKIS: Yes?

DR. SHACK: They will have to do extensive analysis.

COMMISSIONER APOSTOLAKIS: Oh, so the full cost will be the same.

DR. SHACK: Cost is not our concern. But, you know, we're asking for, essentially, internal events; fire, seismic.

COMMISSIONER APOSTOLAKIS: Yeah, I understand.

Dr. Ryan?

DR. RYAN: Commissioner.

COMMISSIONER APOSTOLAKIS: You're asking people to give appropriate consideration to uncertainties to cover fully risk-informed and so

on.

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Do we have something like what we have in Reactor's Regulatory Guide 1.174, that guides people how to make decisions including uncertainty? Do we have anything like that for --

DR. RYAN: I think steps are coming along in that way.

But the answer to your question is no. Most waste determinations are deterministic calculations based on stylized scenarios that are bounding analysis. And because of those limitations, bounding analysis can give you perhaps a bad insight as to what the actual risk might be.

And it often over-constrains waste management decision-making. So I think getting more toward a risk-informed probabilistic approach to understanding risk and the error in that risk estimate would be a real step forward.

If you just back up to the one point I made about the concentration table. That concentration table is based on the probability of

intrusion 100 years post-closure of a site is one.

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And the probability of intruding into the highest concentration waste is one. That's definitely not risk-informed.

COMMISSIONER APOSTOLAKIS: And finally, Chairman Jaczko pointed out that Dr. Powers is about to start or has already started his fifth term.

And for my colleagues on the Commission, I would like to point out that in the previous four terms, I have never heard him use the word enthusiastic in ten minutes so many times.

Obviously, Dr. Powers is getting old.

Thank you, Mr. Chairman.

CHAIRMAN JACZKO: Commissioner Magwood.

COMMISSIONER MAGWOOD: I think that, Dr. Powers, you should also take some comfort in knowing that this is absolutely the happiest I've seen Commissioner Apostolakis since he's joined the Commission. But I won't say it's because he's getting old.

Let me associate myself with your comment about the research infrastructure in the

It's, as many of you know, an issue I've complained about bitterly for quite some time, and it's done very little good so far. We're still losing infrastructure.

Just a general question for you: Are there specific areas you see coming up in the near future where we're going to have a serious shortfall when it comes to infrastructure?

DR. POWERS: Well, the most obvious things are any move toward the TRISO fuel and gas cooler reactors is going to pose a major problem for us qualifying the fuel.

Any step taken to go beyond the current regulatory limit of 62 gigawatt days for conventional light water reactor fuel, NRC will have a problem with the confirmatory research on fuel behavior.

Any moves that are made to go into radical changes in cladding type, such as the move to a silicon carbide clad, they will almost assuredly demand that the NRC do confirmatory

experimental research.

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And they will have to do that, much of that, and the in-pile research will have to be done with collaborative partners outside the country, simply because we don't have access to research grade reactors.

The other area of concern is that as we move toward more radical -- which is to say passive kinds of thermal hydraulic systems, to validate thermal hydraulic codes for passive systems requires full height facilities. We're simply not predictive enough for passive kinds of driving forces.

That's an example of where we need research capacity. It does not exist right now.

My own view is some of the issues in 50.44 and the new hydrogen rule for advanced reactors where we have to worry about stratification and whatnot of hydrogen and the effects on equipment is another area where facilities of adequate acceptability exist outside of this country to do confirmatory research, but

not within the country.

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COMMISSIONER MAGWOOD: You mentioned that the research staff has been reaching out to other countries to get access to facilities.

Do we have all the agreements in place we need to do the work that you're --

DR. POWERS: I think this is a step the Staff has worked on very hard and, fortunately, collaboration is something that benefits all partners. And I think the research is going very well, and it serves another function that I think is very important; it assures that regulatory systems around the world with common type reactors are not diverging very much from each other. So we -- it is a win/win opportunity.

What we see are consortia set up through OECD or set up spontaneously; Bilateral interactions set up spontaneously.

I think the issue, do we have the necessary things in place for that? Yes, I think they're happening naturally, because they're a benefit to all partners involved, and seem to be

working rather well.

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Now, understand that if you're looking for agile research, that is, things that can respond very quickly, partnerships are not the way to go. They're like steering aircraft carriers, it takes a long time to change direction in a collaborative partnership.

Because programs get designed to meet particular regulatory needs, and if those needs change on the part of one partner and don't change for everybody else, it takes a long time to steer the ship. So you're giving up agility in favor of better capability.

Now, the collaborative research does put more eyeballs on the problem. And that is a big help, because the reactor safety research community is fairly small.

COMMISSIONER MAGWOOD: Thank you. one other question about research.

One of the things that I've been curious about, in the research staff, is how they're using sort of the Staff and contractors balance.

have talked about this quite a bit, and he may have some follow-up to this.

But my interest is really, in your opinion, from what you've seen, do you feel that when you look at the work that the Staff is doing, are they using contractors or they ought to be using contractors and are using Staff and they ought to be using Staff? And do you feel that that general balance is about right?

DR. POWERS: The ACRS ordinarily does not make any comment about how research is managed. We worry about the product.

As a personal observation only, the Staff's gone to great lengths to assure that it is the Staff that's presenting to the ACRS, not contractors, by and large.

Once in a while they will bring contractors in for support.

They certainly -- it appears to me, without looking at this in any kind of review capacity, but just as a casual observation,

they're going to great lengths to assure that they have knowledge transfer and that their staff is technically competent to represent the research.

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That's my impression. But, ordinarily, ACRS – eschews the idea of reviewing how research is managed. We look at the product.

COMMISSIONER MAGWOOD: Thank you very much.

I would like to move on to fire for a moment.

I was actually trying to think of different ways to describe -- I came up with deterministically-informed PRA, if that's -- you like that one? Okay.

I think that from what you've already heard from Commissioner Apostolakis and Commissioner Svinicki a little bit about this. I've heard some of the same sorts of things about the level of analysis effort required to deal with, particularly, the multiple spurious activations. I think that's one that has raised the most interest from people I've talked with.

And I do think that -- and I should say

that, you know, I agree exactly with what

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Commissioner Apostolakis said, which is when you talk to people privately, you get a very, very different answer than you might get here at this table from industry sources.

And basically what I think I'm hearing is that the approach that's being taken is ultra conservative. And I wonder if you would just like to give -- now, I recognize that you are still early in the process, you're going through the pilots and there's a lot to be learned.

But I wonder if when you think about the way the NFPA-805 was originally constructed, are there areas that you've had -- you've questioned over time that might have led to some large conservatisms that we should be looking out for, or do you think it's just too early to tell?

MR. STETKAR: That's a lot of material.

First, let me comment on deterministically-informed risk assessment.

All risk assessment, in fact, has -- derives from determinism. We use thermal

hydraulic codes to derive success criteria, for example, for injection in internal events PRA.

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So, in that sense, using, for example, fire modeling to evaluate the propagation of a fire is no different than using a thermal hydraulic code to determine how many pumps or the amount of time required for anything like that.

So PRA is always derived from some type of deterministic analysis basis.

The difference in PRA is we look at an integrated approach, we try to evaluate uncertainties, we try to perform best estimate realistic analyses, rather than traditional licensing based bounding analyses, if you will.

So that kind of clarifies determinism and probability that way.

Regarding level of effort required, the only thing I can offer is my own personal opinions because, as I mentioned, the Committee itself, even at the subcommittee level, has really not had the opportunity to look, in any depth whatsoever, at even the pilot projects.

Risk -- fire risk assessment is probably

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the most difficult area of PRA. If you develop detailed models that evaluate all of the possible outcomes from a fire. Especially in very complex geometries that contain multiple divisions of multiple train -- of equipment in multiple systems.

And, in fact, in some locations for the operating fleet, that's the problem you have, especially in cable areas. It's a very, very difficult problem.

Multiple conservatisms are almost a de facto result of that process, because you're dealing with electrical engineers who, on the one hand, are trying to evaluate, in some cases, fairly complex instrumentation control circuits.

If they need to make an error and the engineer is naturally conservatively biased. If they can't do a complete analysis, they'll take a conservative approximation.

The same is true for the people who are doing the fire modeling; the analogy of the

thermal hydraulics. That if you don't have the capability or the information base to develop the most sophisticated analysis of a fire, you apply a bit of a conservative factor. Combine those two, you get a conservatism on a conservatism.

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And I think that's a bit of the concerns that you might be hearing on an ultra conservative approach, because, in some sense, you do get a bit of a compound effect from those two issues.

COMMISSIONER MAGWOOD: I appreciate that answer. I think that actually helps quite a bit.

My time is more than up, but I think Commissioner Apostolakis' desire to have the Committee provide some sort of review of this and dealing with some of these issues, I think that's an excellent idea and I fully support that.

Thank you, Mr. Chairman.

CHAIRMAN JACZKO: Commissioner Ostendorff.

COMMISSIONER OSTENDORFF: Thank you, Mr. Chairman.

First, I want to thank all the presenters for their briefing today, it's been

very helpful.

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Administratively, I think I would like to add my comments to those of Commissioners Magwood and Apostolakis in the containment accident pressure issue, trying to not just understand -- I thought your description of the key differences between the ACRS and NRC Staff was very helpful.

But I think in the SRM development, we need to ask the Staff also to provide, through an appropriate vehicle, their response to today's briefing, so that we really understand where the delta is from both sides of the table; both ACRS, as well as the NRC Staff.

So I wanted to get that out front with my Commissioner colleagues, as we work on the SRM together.

I want to start off with a couple of questions on fuel facilities. And I want to turn to our distinguished Chairman first. I had a chance to go visit LES recently with my colleague, Commissioner Magwood.

And looking at where we are in the

Digital I&C world, I've been struck a little bit, 76

déjà view from my time in the military where, in the '70s, trained in analog systems and then saw a migration, especially on Navy weapons systems, over to digital.

And then went and visited the Chattanooga TTC area and saw a lot of simulators that had analog components. I was a little surprised by that. And I know that that's a big issue.

But then, when we got to LES with my good colleague friend, Commissioner Magwood, talking to the facility out there and recognizing that there is international experience in the Digital I&C world with respect to centrifuge enrichment capabilities.

I would be interested in some comments on where -- are we properly leveraging, understanding, taking lessons learned from our overseas colleagues and their experience in Digital I&C reliability safety systems and bringing that to bear here within the NRC licensee community?

DR. ABDEL-KHALIK: Unfortunately, our ACRS

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expert on Digital I&C is not in attendance.

DR. POWERS: I may be able to comment on that.

COMMISSIONER OSTENDORFF: And I'll just respond, again, you highlighted a high level number.

MR. POWERS: Right.

COMMISSIONER OSTENDORFF: On slide 4, this topic is a great interest.

DR. POWERS: You have to appreciate that Digital I&C is an international issue. Many of the systems that we are looking at are, in fact, of international design.

And so the answer is, ipso facto, you have to take that experience. Are we running into trouble understanding the criteria for Digital systems? Yes. But so is everybody else.

And in fact, for instance, in the EPR, the primary issue that we're running into is Digital systems, which our colleagues in the United Kingdom have run into this problem, in

Finland have run into this problem, and France has
run into this problem.

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And, in fact, it was the subject of
substantial discussion at our quadripartite
meeting, Subcommittee meeting held in Japan, where
we met with our counterparts from France, Germany
and Japan to discuss exactly what are we doing
with digital electronic systems.

And what I can tell you is, yes, it's a
question that we have on what is an acceptable
digital electronic systems. Not for the operation
plant, but for the safety system of the plant,
because we cannot test them comprehensively, and
it's very difficult to understand what we mean by
failure probability in the context of a digital
system.

COMMISSIONER OSTENDORFF: Okay. That's fine.

I just -- I'm highlighting it as an area of interest --

DR. POWERS: Well, in direct answer to your
question, yeah, this is the preeminent
international issue. You cannot do this on a
country-by-country basis, because the systems

themselves are no longer made in the U.S.A alone,
they're made worldwide.

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COMMISSIONER OSTENDORFF: Well, let me stick with you, Dr. Powers, then, for my second question associated with fuel site -- fuel facilities. And you know -- I think you're aware that we have a fuel site oversight -- fuel cycle facility oversight policy statement before the Commission for our review.

And certainly the foundation of the -- you know, based on ISAs and that methodology, I would just ask you to briefly comment on your assessment as to whether or not there has been adequate research done to bring ISAs to an appropriate maturity level, or is there additional research that should be conducted in that area?

DR. POWERS: The concept of the ISA is, of course, a concept that emerged out of the process chemistry institutions in America.

It is one that has received an enormous amount of attention, and it's one that ACRS is enormously uncomfortable with.

with the ISA as a concept?

DR. POWERS: Much of the ISA is, in fact, a replication of the steps in probabilistic risk assessment, but it does not end in a summation over the accident sequences, so you cannot get a bottom line risk out of it.

More importantly, you cannot derive importance measures out of it and understand which systems and components are crucial to the safety.

That's where we have uncomfortableness with the concept of it. It's simply because they know some of the accident sequences.

The mechanisms for carrying it out I think we're enormously comfortable with, because they are essentially the same as what one does in a PRA. There is not differences between them.

Now, understand that because it came out of the process chemistry industry, that it focuses, in its development, very much on the hazard to the work force, because very few chemical processes pose enormous risks to the

public. But they do pose risks to the facility workers. 81

Of course, that's not different from our fuel processing facilities. Very few of them pose enormous risk to public health and safety, but they do impose risks certainly to the work force and perhaps the very adjacent community.

So it's different, but they're not so terribly different, except for this issue of the summation over the accident sequence, what impact does that have. Well, you don't get nice clean metrics that are easily used for inspection enforcement. And that's the biggest issue to come out of that.

COMMISSIONER OSTENDORFF: Okay, thank you.

Dr. Ryan, I'm going to turn to your presentation very briefly and talk really about -- I had a question on Slide 51.

DR. RYAN: Sure.

COMMISSIONER OSTENDORFF: And this is kind of the period of performance, what kind of a time horizon should be looked at here for depleted

uranium.

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And I know there is some controversy in this area. I know that we're talking about long time periods; until peak or 10,000 years, or something along those lines.

And as I understand your slide -- I may be misinterpreting it, I'm not -- I don't have expertise in this area. But could you comment on the pros and cons of specifying a time period that has broad applicability? Or is it really a time period on each site, based on site-by-site specifics?

DR. RYAN: Thank you for your question, I think it's an important one.

I think the time period of performance doesn't just address the one issue of, you know, what's the right time. The half life, as everybody knows, is 10 to the 9th years for uranium. So it's here forever.

I think the structure has to be around a system approach. What kind of bad outcome are we anticipating. For example, if we have something

in the top five meters of the ground, it's going to somehow intersect the surface probably within the first half life of the uranium.

But if it's buried in a different kind of geohydrologic setting where isolation can be better guaranteed, then the probability of intrusion is a lot less.

Maybe it's those factors that give us the comfort that 1,000 year or 10,000 year or permanent disposal of a quantity of uranium would be appropriate.

So I think the focus of the comment and our letters on the topic will be related to this idea. It's a system, you can't pick one parameter or a number and think about it in isolation from all the others.

It's the amount of material. For example, if I have a tenth of a gram of uranium oxide, that's a whole lot different than 100,000 tons of DU, in terms of the problem I'm trying to manage.

You know, what's the appropriate

geohydrologic setting. I think a humid coastal area is probably less appropriate than a dry inland area, for example. Just as kind of a simple example.

84

And as you go through, what's the packaging arrangement? Sometimes you can package material in a way that gives it even further isolation with high quality. Whether that's through a waste form, something in concrete or some other matrix or the waste package itself, a high quality package, like the ones used in WHIPP and other applications, for example.

So the picture I take is what is the system integration of all of those things, to give us a risk profile for the system, not just the material by itself.

Have I addressed your question?

COMMISSIONER OSTENDORFF: Thank you. Thanks, Chairman.

CHAIRMAN JACZKO: I just had a few questions, and then I thought I'd throw my two cents in or probably one cent in on fire modeling and fire

protection issues.

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Looking -- and this perhaps goes back to the question -- expands on the question that Commissioner Ostendorff asked about digital systems.

I know the Committee has in the past had concerns with -- I don't want to say -- well, perhaps the process or the approach the Staff uses with the use of design acceptance criteria for the digital instrumentation and control systems.

Having seen Dr. Shack's viewgraphs on what used to be COP and now is CAP; how do we avoid a similar situation with that particular issue, because this has the potential, I think, to be an issue that could linger well into the reviews or into the time for completion or Staff coming to final decisions on new reactor design certs or even COL applications?

I don't know if you have a sense of is this heading in that direction or is there a way that we're going to close the gap with the Staff on that issue?

to the Committee. The Committee will write a letter expressing its views on this in the July meeting, during the July meeting.

But we are prepared to offer some preliminary views on the subject. And our colleague, Dennis Bley, has taken the lead on this.

So if I would ask Dennis to comment on this.

MR. BLEY: It is real hard to say how we are going to end up.

But just a few weeks ago, a number of the Staff, in talking to us about this issue, mentioned -- well, reminded us that, in fact, ACRS approved the idea of DAC and, in fact, voted for the existing design certifications. And that's right.

I'd point out, though, that we had some expectations as a committee. And if you go back to our letter of February '92, you'll see those expectations laid out.

Key one was that DAC would be limited, 87

to the extent possible, the amount of design detail that went into DAC would be very limited --

CHAIRMAN JACZKO: Sounds like small and short.

MR. BLEY: I think this one's a little more clear when we get to that point. And we thought it would be closed by the time of COL. And, in fact, talked about the burden --

CHAIRMAN JACZKO: And that would be duration --

MR. BLEY: Talked about the burden that's put on the COL applicants to close the DAC.

Among ourselves, when we'd talk about it, people say, well, don't worry too much, because the Staff will find a way to do these inspections, tests and analyses that will really close this issue well. We expected that.

And because it's a very new concept and never done before, we anticipated ACRS would be involved, at least in the first applications, all the way through closure.

Well, what we've observed in the last

few years is that the new designs, the I&C has really highly integrated systems probably well beyond what anybody imagined 20 years ago. Human Factors Engineering has a bit of the same ability to affect the whole plant.

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Also, Digital I&C, we're seeing more design details relegated to DAC than, at least we think, is necessary. And we can talk about that some, if you'd like. More importantly, the COLAs are bringing this to a head.

Most of these are not being resolved in the COL applications, they're being passed on through for resolution later.

And that means any level of comfort now transfers over to how they will be closed in that process.

These are really key systems that are pervasive throughout the plant. And it's not quite in the spirit of the original SECY that laid out the idea of DAC, of being limited.

Also, what does it take to close the DAC if you do it after the COL?

We've started asking that in all the design cert meetings we have had. And it's something I think each of us thought we knew and we all had different ideas. And I think the same, we've seen, if you look at our transcripts, is true with Staff.

We've heard they'll be sampled. We've heard there'll be 100 percent, I&C DAC will be inspected, examined, reviewed and approved by Staff. The inspections will be a lot more than a normal ITAC. The inspections will look just like the normal ITAC.

We are pleased that Staff last year started a work group to lay out how these DAC will be resolved and closed. And we are looking forward to seeing details of that.

So far, I know there was a public meeting last month, but in a couple of meetings we were expecting to see some of the details of where it's headed. They weren't quite ready to talk with us.

Can that bring it all together? We're

not completely sure.

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We're a bit uncomfortable that the original expectations seem not to be there, and we want to lay those out kind of carefully.

And we're hearing bits and pieces as we communicate with Staff. We haven't got it really carefully that we're on the same page as yet. And we're hoping we will be, but there has to be a way to get these really important systems to the point that gives us comfort, and it takes meeting those expectations.

The COLs aren't approved as yet. It could be pushed there, but that's not the way things are headed right now.

CHAIRMAN JACZKO: Well, I appreciate that and I think, clearly, this is an issue we're going to need to address in the short term rather than the long term, and I think we'll look forward to your letter in July. It's really something we can pursue with the Staff from their end and perhaps in the next meeting, I think targeted usually for December, I would suggest we touch on this topic

and run it to ground as soon as we can, because I think timely resolution is going to be important.

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I think we don't want to get to the point of being -- issuing or making decisions on COLs and not have this issue be resolved one way or another, as we can.

I'm running a little bit short on time but, Mike, I'll just make a comment on your proposal and then turn to some fire protection issues.

I think the issues we've dealt with in -- for risk-informing the waste classifications, I think those were good issues and the right way to go. I think there is a lot of areas in which that system can be improved.

As I just looked --from the Committee's letter, the two things that stood out to me, I think, one is the use of the term "realistic."

I think Commissioner Svinicki asked, and I had written it down about what the definition of impractical is. "Realistic" is also one of those terms that I'm not sure is within the regulatory

We've used it in other contexts, but I don't know that we've ever used it in the context of a safety regulation. That we have -- we generally have built regulations with -- not with realism, but with margin, which implies a degree of realism plus.

And so, I think it was interesting to see the term "realistic" in there, rather than something with a higher degree of margin.

Now, maybe that's just in the modeling, not necessarily in the regulations. So it was just something that struck me.

The other thing that struck me was, again, as we look at this, was the focus on that there was lot of site specificity to the analysis. And I think there's a degree of site specificity that needs to be there, but I don't think every licensing review can be site specific.

There has to be, I think, some degree of general regulatory requirement to inform and guide the process so that there's an expectation of what

standards are and what is acceptable and not acceptable going in.

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So just some comments as we go forward.

And I just wanted to close on 805. And I think Commissioner Apostolakis hit the nail on the head, I think, with his first comment, which is, I think in many ways -- 805, the methodology did, I think, outstrip the capabilities of PRA.

I don't think that's a bad thing, I think that's been the kick in the pants, so-to-speak, to get the infrastructure, the PRA models in better shape. And I've heard a lot of the same concerns that my colleagues have heard.

I think a lot of those concerns are somewhat -- I think no longer accurate. A lot of it came about from the first round of PRAs. The first round of PRAs, as they went through peer reviews, were not really acceptable. We did not at that time have -- we did not ANS, the ASME standard for fire PRAs.

We now have that standard. So I think the subsequent generations and the PRAs, as they've

been modified through the review process, are in much better shape than they were. And a lot of the uncertainties and issues -- there were issues of, you know, that the PRA models were showing multiple core melts per year through fire initiating events.

Those issues have largely been addressed or the uncertainty is recognized so that they're not being used in that way.

Mr. Stetkar, I don't know if you want to comment on that.

MR. STETKAR: Yeah, I think you've hit a bit of it. It's a bit of a growing pain of applying the risk assessment technology to something that many risk assessment practitioners really do not have much experience with. And I harken back to 30 years ago, when we were starting to do the first risk assessment work.

I was involved in a couple of risk assessments where people spent months literally developing models of reactor protection systems down to such a fine level of detail that the

computer codes that is we had in those days could not solve the logic models.

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Literally, many, many months of effort primarily because the people doing the analysis did not have the knowledge or the experience to develop, if I can use the term, reasonable models.

I think, in some sense, we're going through those growing pains in the area of detailed fire risk assessments right now.

So I think some of the things -- I kind of agree with you that as we have better standards, better criteria and more experience on doing actual analyses, I believe that we should benefit from that experience, in terms of the level of effort required.

That being said, it's still a difficult project.

CHAIRMAN JACZKO: I don't think -- and I think, you know, in the context -- and, of course, the context is that this is a difficult problem regardless, if with don't go the NFPA-805 route, then I think as Commissioner Magwood said, there's -- you

know, I think we're starting to hear now the concerns about the multiple spurious actuation methodology that the Staff is proposing. That is a very challenging problem as well.

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So absent a PRA approach, that becomes very, very difficult.

So, to some extent, it's a choice between two very difficult phenomenon and -- or resolution paths.

Again, I appreciate the presentations. I think we -- the issues we have for consideration for PRA, I certainly would second the concern or the interest in having ACRS take a look at the issues.

I would suggest, perhaps, that taking a look at the first license amendment that the Staff approves, that that might be a good focal point. That should be finalized very soon. After that's released, the Committee could come back and report on that.

And that might be a good place to focus that review and get a sense of what the methodology is

and how it's working.

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The other issue I think Commissioner Ostendorff raised was on looking and finalizing, I think, what the issues are and I think others have talked about for the containment accident pressure issue. And I know we're anticipating a Staff paper.

But certainly, I think, out of this SRM if we could provide some guidance to the Staff about what to make sure to include in that paper, I think that would be helpful so we make sure we address the issues and it goes on ahead.

I think -- don't know if anybody has any comments they want to make on those -- but that seems like what I heard for the issues to consider for the SRM.

All right. Any other comments from my colleagues?

Okay. Well, again, I want to thank everybody for, as usual, a very informative and excellent meeting.

Thanks.

(Whereupon, the proceedings were concluded)

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