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TRANSCRIPT OF PROCEEDINGS

# APPEARANCES

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Commissioner
U.S. Nuclear Regulatory Commission

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

2 BRIAN SHERON: Okay, well good afternoon. I'm Brian Sheron,
3 I'm the director of the Office of Nuclear Regulatory Research, and I have the
4 privilege of introducing Commissioner Apostolakis. The Honorable George
5 Apostolakis was sworn in as a commissioner of the United States Nuclear
6 Regulatory Commission on April 23rd, 2010 to a term ending on June 30th, 2014.
7 Dr. Apostolakis has a distinguished career as an engineer,
8 professor, and risk analyst. Before joining the NRC, he was a professor of
9 nuclear science and engineering and a professor of engineering systems at the
10 Massachusetts Institute of Technology. He was also a member, and a former
11 chairman, of the Statutory Advisory Committee on reactor safeguards at the
12 NRC.
13 In 2007, Dr. Apostolakis was elected to the National Academy of
14 Engineering for innovations in the theory and practice of probabilistic risk
15 assessment and risk management. He received the Tommy Thompson award for
16 his contributions to improving the reactor safety in 1999 and the Arthur Holly
17 Compton award in education in 2005 from the American Nuclear Society.
18 Dr. Apostolakis is an internationally recognized expert in risk
19 assessment. He received his diploma in electrical engineering from the National
20 Technical University in Athens, Greece in 1969. He earned a Masters degree in
21 Engineering Science from the California Institute of Technology in 1970 and a
22 Ph.D. in Engineering Science and Applied Mathematics in 1973, both from Cal
23 Tech. Commissioner?
24 [applause]
25 COMMISSIONER APOSTOLAKIS: Thank you. Thank you Brian,

1 the only thing you didn't give was my birthday.

2 [laughter]

3 I am going to talk about a proposal to risk inform our regulatory

4 system, and it's still a proposal, nothing has been approved. In late 2010,

5 Chairman Jaczko approached me and asked me whether I would be willing to

6 lead a task force to propose a risk-informed performance-based regulatory

7 system for the agency, and the task force was indeed formed in February of last

8 year, and the chart that is shown here to develop a strategic vision, and options

9 for adopting a more comprehensive and holistic risk-informed performance-

10 based system for all the offices, all the activities of the agency. I formed a task

11 force --

12 [laughter]

13 I don't think your reaction is appropriate because --

14 [laughter]

15 -- we all know political appointees do not make mistakes. I worked

16 with these four people very closely, and they confirmed once again that we have

17 an excellent staff, and I have very high regard for them. We debated issues and

18 ideas, and in addition to the four, we had individual contributions from other

19 people, so we've been working on it for about 12, 13 months now. The final

20 report will be issued in early April.

21 So, we have in mind developing a vision that would be something,

22 maybe, that we can achieve in 10, 15 years, and we wanted to build on

23 everything we have learned in the last 20 years, and I would like to point out that

24 we really wanted the approach to be evolutionary. We are not going to propose

25 anything radical because we believe that if you propose evolutionary

1 approaches, you have a higher probability of success.

2 Of course, a month after the task force was formed, the Fukushima

3 accident occurred, and about three months later, our task force recommended to

4 the Commission that we should establish a logical, systematic, and coherent

5 regulatory framework that appropriately balances Defense in Depth and risk

6 considerations. So we are hoping that our work will help the staff as they're

7 working on this.

8 I mentioned that this approach is evolutionary, at the same time, I

9 know that a lot of people have been complaining that we are not -- we have

10 slowed down in risk informing our regulations, and many times we're using very

11 old rules that were developed 40 years ago to resolve problems, so I'm hoping

12 that -- I thought this was going to be a big success.

13 [laughter]

14 [laughs] That goes to show you. Anyway, let's start the serious

15 stuff. We start -- this is now the risk management framework that would be

16 applicable to all NRC activities. We start with the mission of the agency, ensure

17 adequate protection of public health and safety and promote the common

18 defense and security, and protect the environment. Then we're proposing that

19 the agency state, as its objective, the fact that it manages risk, and of course,

20 risks from the byproducts, sources, special nuclear materials, and the agency

21 does so through appropriate, performance-based regulatory controls and

22 oversight. I think it's important that everyone accepts this language of risk

23 management, so we'll away from things like the deterministic approach and the

24 probabilistic approach; they are both managing risks in a different way. So I think

25 the value of adopting such an objective is that we will all be speaking the same

1 language and we won't have these unnecessary debates, you know, use
2 conservative, deterministic approaches and so on. There is nothing deterministic
3 about them, by the way.
4 Then, we're proposing, as a risk management goal, a combination
5 of traditional methods and risk-informed performance-based methods. So we are
6 offering a risk-informed performance-based definition of Defense in Depth. There
7 are two bullets here: the first bullet says that we will install appropriate barriers
8 and controls and make sure we have well-trained staff to prevent, contain, and
9 mitigate exposure to radioactive materials, and we will establish these controls
10 and barriers by taking into account the relevant scenarios, the hazard present,
11 and the associated uncertainties. The hazard present, for example, the controls
12 for nuclear power reactors clearly cannot be the same as the controls, say, for
13 radiographer; and the uncertainties, the more uncertain we are, the more
14 conservative we become, and of course, the issue of unknown unknowns comes
15 into the picture here, and we are trying, by being conservative, to protect
16 ourselves against those, but then after we do that there should be a check. And
17 we are proposing that the analysts start -- developing scenarios where they
18 assume that some or all of these protections fail, and those would include, of
19 course, human errors, and then they should make a judgment that the risk from
20 these scenarios is acceptably low.
21 Now, that doesn't mean that these -- this has to be a quantitative
22 conclusion. In fact, in a lot of the activities of the agency, this would be a
23 judgment, but still, it seems to me, it would be valuable if people felt that they had
24 to do this, and of course, if the risk is not acceptably low, it's high, then something
25 else needs to be done to bring them down; and on the other hand, if it turns out

1 that it's way too low, maybe we can relax some of the requirements so we'll
2 approach the acceptability level.
3 So, these two proposals form the definition of risk-informed
4 Defense in Depth that we are proposing, and the final box in the framework deals
5 with the way we make decisions, again, this is not a revolution here, this is basic
6 decision analysis, and in fact, our own regulatory guide 1.174 uses process like
7 this, but we are proposing that this become something that everyone in the
8 agency uses. So we typically start with an issue that has to be resolved, and
9 then this -- the second box says, well, then you should identify some decision
10 options that will help you resolve this issue, and then each one of these should
11 be analyzed.
12 Now, analysis here means anything that's relevant. It could be a
13 thermohydraulic analysis, could be materials-related analysis, and it could be a
14 risk assessment. The results of the analysis and the appropriate sensitivity
15 studies will be fed into a deliberative process. This is where -- or what we call in
16 the regulatory guide integrated decision making process. This deliberation will
17 be a probably informal interaction among decision makers who are dealing with
18 this issue who will utilize the results of the quantitative analysis, but then will go
19 beyond those results, they will question the assumptions, for example, of the
20 analysis, but they may bring into the decision-making process other issues that
21 are relevant, but have not been quantified by the analysts, and maybe some of
22 them will be legal constraints, for example.
23 The result of this deliberation will in fact be the decision. I point out
24 that the decision will not be based on analytical results alone. That's why there is
25 this deliberation in between because that's really the way we make decisions.

1 Very rarely you run a computer code and you make a decision based on the
2 results, and that issue there probably is not that important. And then of course
3 after the deliberation, the decision is implemented, and the new situation is
4 monitored, and if necessary, we will go back and repeat the cycle.
5 So the idea here is that everyone will have this process in the back
6 of their minds. That doesn't mean that every single time for every single decision
7 problem you will have to write an essay on each of these boxes, but it's a good
8 idea to have it in the back of our minds and think that way.
9 So this is the risk management regulatory framework, it consists of
10 the objective that I mentioned, the risk management goal, and the decision-
11 making process. In the -- then of course, the tax force recommended to the --
12 recommends to the Commission that it issue a policy statement accepting or
13 adopting this risk management regulatory framework. By the way, this report will
14 go to the chairman, since he commissioned it, so it's up to him what to do with it.
15 The report touches on all of these activities of the agency; you will
16 see security is not there, it was a deliberate act. We feel security and safety
17 should be dealt with the same way, so the same way I defined risk-informed --
18 the performance-based Defense in Depth, then the security people will have to
19 do the same thing, if this is adopted. So there is no special separate section of
20 security; security and safety go together.
21 And now I will focus on reactors. We present a number of findings
22 and recommendations in the report, so I picked a couple to show you -- to you
23 here. As we are starting our work thinking about it and what to do and so on, it's
24 always a good idea to interact with outside people to seek how they view what
25 you're about to do, and we got very strong input, both from our own staff and

1 industry representatives, that whatever we do we should maintain the concept of
2 design basis, that it has served both us and the industry well. Both sides know
3 what is expected from the other side, so this is a finding that a concept of design
4 basis events and accidents continues to be a sounding licensing approach, but
5 then -- but there is always a but -- but the set of design basis events on
6 accidents, or at least some important ones, have not been updated to include
7 what we learn from operating experience and PRAs. I mean, I find it very
8 interesting that certain issues like GSI 191 that was mentioned earlier is declared
9 a design basis event, which means that you look this way at all the PRA results,
10 all the sequences that have been developed for loss of coolant accidents. You
11 are not supposed to use those insights because they are not allowed in the
12 design basis. That's absurd. So what we're -- oops -- yeah, we're proposing --
13 we're proposing to go back and reconsider these [unintelligible] and make sure I -
14 - oh God. Okay.
15 [laughter]
16 So there's a set of design basis events and accidents should be
17 reviewed and revised as appropriate to integrating size from the power reactor
18 history, in fact that's what former Chairman Diaz did a few years ago when he
19 said, well, look, operating experience is telling us that large pipes have not failed.
20 No, we haven't seen any large pipes failing, so that's information. How do we
21 bring that into our regulations, and that was a genesis of what became 50.46(a),
22 which is still before the Commission.
23 Another two findings that are relevant is -- they deal with beyond
24 design basis events. These are things like station blackout and anticipated
25 [unintelligible] without scram. So these were established, that's a finding, at

1 different times and in different ways, and there are differences in implementation.
2 Another important finding has to do with voluntary industry
3 initiatives, and I visited all four regions and spent good time with senior reactor
4 analysts, and it was interesting that in all four regions I heard the same thing, that
5 during the significance determination process, as the finding tends to go to red,
6 the licensee typically comes back and wants to show that the frequency of -- the
7 significance of the finding is not that great, and that the so called B.5.b
8 equipment can be used in the sequences to reduce the frequency, and the
9 reactor analysts counter that the NRC has no control of these -- over these
10 equipment, therefore they can go -- cannot give them any credit, and that,
11 apparently, is always a point of friction between us and for our people at the
12 regions, and the licensees.
13 So this situation and the beyond design basis area, I think, needs to
14 be put in some more order, and we are proposing -- we are recommending that
15 the NRC establish, via rule making, a new category called design enhancement
16 category for beyond design basis events or accidents, and in this category risk
17 should play a role -- and I'll show you in a moment -- the regulation should be
18 performance based, and consideration of cost should be allowed, and they
19 should be -- this category should be defined on a site-specific basis. So this is
20 similar to the design extension category that the Fukushima task force proposed,
21 although they proposed that it be under adequate protection and we're saying no.
22 So here is now the triplet of categories on the right. We will still
23 have the adequate protection category, and then the proposed design
24 enhancement category, and of course, finally, everything else, the proposed
25 residual risk category. So all design basis events and accidents will go into the

1 adequate protection category, and any other rule that the Commission declares
2 as adequate protection, it would go there automatically.
3 In the design enhancement category now, again, the Commission
4 may declare a particular rule is cost beneficial. It would go in that category, but
5 also we will have criteria that I will show you in a minute that will determine how
6 other things, other sequences, may end up in that category, and then of course,
7 after you are done with the adequate protection category and the design
8 enhancement category, everything else will go to the residual risk category.
9 So a little more detail on the design enhancement: There are three
10 questions that are very significant: Who decides what is included, what criteria
11 are used for inclusion, and what criteria are used for disposition? Who decides
12 what is included? Well, it could be us. It could be the NRC. In fact, that's what
13 we say now, I mean, we declare, at worst, to be a beyond design basis event, but
14 the utilities have to do something about it. We can improve on that by developing
15 criteria for inclusion, so even if the NRC does it, at least it will follow certain
16 criteria that have been agreed upon with the stakeholders, or the licensees may
17 use their site-specific PRAs and come back to us and say we follow the
18 acceptable process, and here is what we found. These are the sequences that
19 belong in this new category. Now, how would they decide that?
20 You know, we repeatedly say in the report site specific, site specific,
21 because I think that's really a better way of regulating, to issue some general
22 criteria and so on, but then have the licensees apply those to their own site and
23 come back and tell us what they have learned, and I remember in the old days,
24 after the industry had done several PRAs, a lot of the experienced people who
25 had worked on those were going around the country saying that if we learned

one thing from all these PRAs, is that each PRA is unique to the site. Unfortunately in the United States, sites differ significantly, so the -- I don't know why I said unfortunately, by the way.

[laughter]

It may be fortunate. It creates a lot of work for a lot of people. The -- so they have to be site specific, they have to be site specific. Now, what criteria are used for inclusion? We just offer some ideas, we are not really defending those to death, clearly the staff will have to go through the regular process of issuing regulations to proposed concrete criteria, but for example we might say, look, you take all the initiating events of frequency greater than a particular number, and all the sequences emanating from those initiating events are candidates. Candidates to be include in the design enhancement category, or, instead of looking at initiators, you are looking the whole sequence, and you say, again, if the -- all the sequencers whose frequency is at least Y are candidates. Now, that's a lot of sequences, so how do we disposition it? Well, a lot of these sequences will have a risk that is less than a particular number agreed upon in advance, so these will go immediately to the residual risk category. The ones that remain high -- on a relatively high frequency -- then the licensee would be asked to do a cost benefit analysis to apply ALARA to reduce the frequency of those sequences as is reasonably achievable. There are some interesting questions here, are you going to allow ALARA for sequences that are -- that have very high frequency, for example, or are you going to order them to reduce it anyway, so again, I’m saying the task force is throwing out ideas, it's the staff that, if the Commission desires, will take this and come back with a more concrete proposal, or there can be a combination of frequency and cost

1 arguments.

2 This is all for power reactors, what we are proposing is that -- we
3 definitely not proposing a wholesale change of the regulations; I remember this is
4 an evolutionary approach, but the staff, we believe, should go back and select
5 rules that maybe are ancient or new information would be valuable to include in
6 those rules, and start revising those rules, to some extent this has been done,
7 and I mentioned already 50.46(a).

8 For the design enhancement category, it would be very important to
9 answer the three questions, and possibly others, that I just showed you, namely,
10 the inclusion, exclusion, and disposition guidelines, but also we will have agreed
11 in advance with our stakeholders what the regulatory treatment of system
12 structures and components that support these sequences will be because now,
13 every time we are trying to risk inform regulations, we start a debate from
14 scratch, like 50.46(a). You have the transition break size, so breaks above the
15 TBS are not to be treated in the standard way of design basis, but then how are
16 you going to treat them, and there is a raging debate what you do there and what
17 kind of Defense in Depth you should have. In 50.46(a), it's the same thing. Well,
18 that's a thing.

19 I mean, there was another example which escapes me right now,
20 but -- oh, the 50.69. The graded quality assurance, again, using risk information
21 we had a category of components that are safety related now. They were
22 declared safety related 40 years ago, but risk analysis shows that the risk is very
23 small, so then people said maybe we shouldn't treat them as safety-related
24 components anymore, but what should we do with them, and the debate on what
25 should we do with them was so fierce that nobody adopted 50.69.

1 So all these will be agreed upon in advance, so if the thing goes
2 into the design enhancement category, we will have a good idea what the
3 regulatory involvement will be. There will be a number of challenges in addition
4 to management commitment and so on, but the third bullet, for example, if we
5 adopt these, most likely we will need to revisit some of the methods of risk
6 assessment and see whether we can develop them further. The industry and our
7 staff like consensus codes and standards, and we have a few already from the
8 ASME and ANS, but most likely we will need more of those, and these take time
9 to develop.
10 In the fourth bullet we're saying that if we take this ALARA thing
11 seriously, and we say that this is one of the things that can be used in this new
12 category, then we definitely need to revisit our methods for doing cost benefit
13 analysis, and make sure they will be appropriate for such utilization.
14 There will be many benefits, our regulations will be more up to date,
15 including, again, as I said earlier, operating experience insights and risk
16 assessment insights. There will be consistency in language and communication,
17 but the last bullet, I think, is important. The -- we will have agreed in advance
18 what the criteria are for putting sequences in that category, and we will have
19 agreed in advance what regulatory treatment these components will get. I think
20 that will go a long way towards eliminating unnecessary debates that we seem to
21 have every few years, and the approach we are proposing may contribute to the
22 resolution of the patchwork issue that was identified by the Fukushima near-term
23 task force, and would contribute to the resolution of recommendation one. A
24 voice from the past.
25 Now, I'll take you back about 2,500 years ago. Nuclear power didn't

exist then, of course, but the two major cities in Greece, Athens and Sparta, started a major war that was the beginning of the decline of the Greek civilization, the Peloponnesian War. After the first year, the Athenians had a ceremony to honor their dead soldiers, and they happened to have a great man as a leader named Pericles, and of course, as leaders of nations ever since then have done, he stood up and talked about how great Athens was, and that these soldiers did not die in vain; they died defending something that was worthwhile.

He gave a beautiful speech praising Athens, he defined democracy, that it's -- he said our system is -- relies on the will of the many and not of the few, that why we call it democracy, and among other things, he said something that I think is relevant to us. He said, “We Athenians take our decisions on policy and submit them to proper discussions.”

Do we do that? Of course we do, it's great. We have a full process interacting with stakeholders, we debate among ourselves, and so on. The worst thing is to rush into action before the consequences have been properly debated. I think we don't rush into action, in fact, we are too slow sometimes, and this is another point where we differ from other people. We are capable, at the same time, of taking risks, and of estimating them beforehand. Now, we don't do that all the time. When he said that they estimate risks, he didn't mean PRA.

[laughter]

One of the things the Greeks did not do is develop the concept of probability. They left that to the French 20 years later, people like Fermat and Laplace -- 20 centuries later, centuries --

[laughter]

-- but what he meant was this subjective evaluation of likelihood

1 and consequences, and our framework, of course, allows for subjective
2 judgments and evaluations, but it's interesting that he says, “We are capable of
3 taking risks and of estimating them beforehand. Others are brave out of
4 ignorance and when they stop to think, they begin to fear.” What do we do when
5 we're ignorant? We become more and more conservative. We put extra
6 Defense in Depth there to make sure that we won't be surprised, but "the man
7 who can most be truly accounted brave is he who best knows the meaning of
8 what is sweet in life and what is terrible, and then goes undeterred to meet what
9 is to come"; and I submit to you that if you embrace the risk-management
10 regulatory framework, your life will be sweet. Thank you.
11 [laughter]
12 [applause]
13 BRIAN SHERON: I just -- one quick announcement, I was told that
14 there have been some complaints about the heat and the Marriott is aware of it,
15 and is working on it. So just please bear with the management here.
16 Commissioner, last year you answered a lot of questions with one word, so I
17 hope you can do it now because I have a lot of questions.
18 [laughter]
19 When you refer to risk, are you only considering radiological risks
20 rather than all risks?
21 COMMISSIONER APOSTOLAKIS: Primarily radiological, yes.
22 [laughter]
23 BRIAN SHERON: Thank you.
24 COMMISSIONER APOSTOLAKIS: What else can I say? I mean,
25 that's...

1 [laughter]

2 BRIAN SHERON: Let's see, this question says Japan is sitting on
3 a -- on tectonic plates and sandwiched between major faults and subduction
4 zones. What are your views of Fukushima design basis and flood mitigation
5 features?

6 COMMISSIONER APOSTOLAKIS: Well, I've expressed those
7 views before, and I think reports from Japan and here, like the American Nuclear
8 Society report that was issued last week, they have confirmed that the tsunami
9 design basis was inadequate, and critical equipment were at lower elevations
10 when, by doing a simple risk assessment for floods, it would have decided that
11 you needed to put them on a higher elevation. So yes, there were some
12 problems with design basis, significant problems.

13 BRIAN SHERON: This says how does -- how does the
14 Commission take into account the social and economic consequences of a
15 nuclear event. Economic consequences from Fukushima are expected to -- or
16 will exceed $100 billion.

17 COMMISSIONER APOSTOLAKIS: The Commission does not take
18 into account that stuff.

19 [laughter]

20 BRIAN SHERON: What do you think about using probabilistic risk
21 assessment tools on activities different from reactors, as for example
22 radiotherapy treatment?

23 COMMISSIONER APOSTOLAKIS: Well, we all know that risk
24 assessment means us answering the three standard questions of what can go
25 wrong, how likely is it, and what are the consequences. It seems to me it's a

1 good idea to ask these three questions in non-reactor applications as well, and
2 sometimes, like in high level waste repositories, we try to answer all three
3 questions and we do a lot of work, and so on, and in other areas maybe we use
4 judgment and so on, but it seems to me that attempting to answer the three
5 questions is a good idea, not necessarily quantifying the answers.
6 Now, for medical treatment you have a slightly different -- well,
7 significantly different situation because, of course, people are voluntarily
8 submitting themselves to those risks. It's not involuntary anymore, and people
9 have known for a long time that the distinction between voluntary and involuntary
10 risk is extremely important. We have great demands of safety and low risk when
11 we're submitted -- subjected to a risk that is involuntary, but voluntary -- so I don't
12 know what to do there, we -- as you know, we have a problem defining what is a
13 medical error, and we are getting very close now to medical practice which we
14 should not invade, so yes, it's a good idea to attempt to answer the three
15 questions, but you have to take into account the special circumstances of the
16 situation, and I think I used a lot of words answering this question --
17 [laughter]
18 -- Brian, so you should be happy now.
19 BRIAN SHERON: Okay, this one is: Although several current sites
20 are or will have new reactors built, would NRC ever consider mandating more
21 remote siting, like a minimum EPZ, minimal population, larger distances from
22 populations, et cetera?
23 COMMISSIONER APOSTOLAKIS: I thought we were doing that
24 already, but yes, sounds like a good idea if we're not doing it.
25 BRIAN SHERON: Let's see. Many people cite the absence of

1 observed failures as evidence of success, but there are only less than 104
2 reactors times 100 years, which is less than $10^4$ reactor years of experience, less
3 than 1 percent of the desired time between failures, so how can operating
4 experience be used as evidence that all is well?
5 COMMISSIONER APOSTOLAKIS: That's a little over
6 exaggeration, I didn't say that operating experience should be used to indicate
7 that all is well, but it's certainly something that should be used, and for example,
8 nobody in his right mind is proposing that for very large breaks, pipe breaks, we
9 do nothing. It's precisely because we feel that this experience is not strong
10 enough to tell us that these pipes will never fail, but at the same time, we have
11 strong evidence that these pipes have not failed over a few thousand pipe years,
12 and maybe that should be used a little bit to inform our regulations. It's a difficult
13 issue, that's why you have five commissioners and that's why you have a staff
14 that proposes alternatives.
15 BRIAN SHERON: This one is: Can you please comment on the
16 use of the ASP, or the accident sequence precursor approach for detecting plant-
17 specific safety performance degradation?
18 COMMISSIONER APOSTOLAKIS: Using ASP?
19 BRIAN SHERON: Using the ASP program.
20 COMMISSIONER APOSTOLAKIS: Well, the accident sequence
21 precursor program tells you how close you came to a -- to a major event like core
22 damage and so on. Now, if you draw some insights from there as to what should
23 be improved and what, maybe, we have not been doing very well, then that's
24 great, but other than that, I don't know that I can say anything else.
25 BRIAN SHERON: Okay. What is the role of level three PRA in the

1 future of the NRC?

2 COMMISSIONER APOSTOLAKIS: It will make its life sweet, as I

3 said.

4 [laughter]

5 Well, let me tell you about the level three PRA because a lot of

6 people seem to be uncomfortable with it. The reactor safety study in 1975 did

7 one. NUREG 1115 in the '80s did two, and now we are in 2012 and we're still

8 debating whether we should do a level three PRA or not, and then we get the

9 Fukushima recommendations, and then we start arguing which one is more

10 important and so on. If we had site specific level three PRAs, they could have

11 been used to prioritize these recommendations. This is the most complete model

12 of a site, and just beyond even why we don't want to do it. Well, we don't want to

13 do -- some of us don’t want to do it. It's not that expensive, in my view,

14 considering the benefits, and yet, you know, we've been now using core damage

15 frequency and large early release or large release frequencies metrics, which is

16 fine, I mean, for day to day operations, but it would be nice to have a site-specific

17 model, and I believe this will become even more important when people, again,

18 start arguing that maybe we should have a 50 mile EPZ for all sites around the

19 country. Then I'd like to see all the small modular reactors that go on to have a

20 smaller EPZ. I don't know how I can make decisions like that without a level

21 three PRA. That's the way it is.

22 BRIAN SHERON: Okay, I think we have time for one last question.

23 COMMISSIONER APOSTOLAKIS: Okay.

24 BRIAN SHERON: Fire PRA realism has been difficult to achieve

25 and has led to reduced enthusiasm for PRA solutions for regulatory issues. How

1 is this problem surmounted?

2 COMMISSIONER APOSTOLAKIS: By doing a better job when

3 people collaborate and produce NUREG reports that they reject the next day.

4 That's the answer.

5 [laughter]

6 [applause]

7 BRIAN SHERON: Okay, thank you very much.

8 [applause]

9 Okay, thank you, I believe right now, until 3:00 there's a break. So

10 if you would want to take a break now and then reconvene at the breakout

11 session is at 3:00.

12 [Whereupon, the session concluded]