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ACR-57-3139

**OFFICIAL TRANSCRIPT OF PROCEEDINGS  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS**

**Title:           ACRS - ADVISORY COMMITTEE ON  
                  REACTOR SAFEGUARDS  
                  478TH ACRS MEETING**

PROCESS USING ADAMS  
TEMPLATE: ACRS/ACNW-005

**Work Order No.:   NRC-1596**

**LOCATION:           Rockville, MD**

**DATE:             Friday, December 8, 2000**

**PAGES: 390 - 445**

**ACRS Office Copy - Retain  
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1 UNITED STATES OF AMERICA  
2 NUCLEAR REGULATORY COMMISSION

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4 478TH ADVISORY COMMITTEE ON  
5 REACTOR SAFEGUARDS (ACRS)

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8 U.S. Nuclear Regulatory Commission  
9 11545 Rockville Pike  
10 Room T-2B3  
11 Rockville, Maryland

12  
13 Friday, December 8, 2000

14  
15 The above-entitled meeting commenced at 8:30 a.m.,  
16 pursuant to notice, the HONORABLE DR. DANA A. POWERS,  
17 chairman, presiding.

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## 1 ACRS COMITTEE:

2 DR. DAN A. POWERS, Chairman

3 DR. GEORGE APOSTOLAKIS, Vice Chairman

4 DR. THOMAS S. KRESS, ACRS Member

5 MR. JOHN D. SIEBER, ACRS Member

6 DR. GRAHAM B. WALLIS, ACRS Member

7 DR. ROBERT L. SEALE, ACRS Member

8 DR. WILLIAM J. SHACK, ACRS Member

9 DR. ROBERT E. UHRIG, ACRS Member

10 DR. MARIO V. BONACA, ACRS Member

11 DR. LEITSCH, ACRS Member

12 DR. JOHN T. LARKINS, ACRS Executive Director

13 MR. JOSEPH MURPHY

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

[8:30 a.m.]

1  
2  
3 CHAIRMAN POWERS: The meeting will now come to  
4 order. This is the third day of the 478th meeting of the  
5 Advisory Committee on Reactor Safeguards.

6 During today's meeting, the Committee will  
7 consider proposed modifications to the Commission's Safety  
8 Goal Policy Statement for Reactors. We'll have an  
9 unfortunately abbreviated discussion of the NRC's safety  
10 research program, a discussion of future activities, and a  
11 report of the Planning and Procedures Committee,  
12 reconciliation of ACRS comments and recommendations.

13 We'll have the election of ACRS officers for  
14 calendar year 2001, and we'll discuss some proposed ACRS  
15 reports.

16 This meeting is being conducted in accordance with  
17 the provisions of the Federal Advisory Committee Act. Dr.  
18 John T. Larkins is the Designated Federal Official for the  
19 initial portion of the meeting. We have received no written  
20 comments or requests for time to make oral statements from  
21 members of the public regarding today's session.

22 A transcript of portions of the meeting is being  
23 kept, and it is requested that speakers use one of the  
24 microphones, identify themselves, and speak with sufficient  
25 clarity and volume so that they can be readily heard.

1 I'll remind members that we're scheduled to have a  
2 picture taken, and that during the lunchtime break, we will  
3 be interviewing possible candidates for membership of the  
4 Committee, and that we are going to celebrate Christmas with  
5 the Staff today.

6 MR. LARKINS: Dana, since it's going to be hot  
7 food, they're going to try to start at 11:30 or as close to  
8 11:30 as possible.

9 CHAIRMAN POWERS: Okay, we will endeavor to stay  
10 closely on schedule, and I don't think that's a problem.

11 Any members have any other opening comments they'd  
12 like to make?

13 [No response.]

14 CHAIRMAN POWERS: Then we'll move to the first  
15 item of business, which is proposed modification of the  
16 Commission's Safety Goal Policy Statement for Reactors.

17 Professor Apostolakis?

18 DR. APOSTOLAKIS: Thank you. I suspect that this  
19 whole effort was started with the report that we sent to the  
20 Commission in 1997, suggesting or recommending that the core  
21 damage frequency goal of ten to the minus four be elevated  
22 to the level of a fundamental goal.

23 We also recommended several other things such as  
24 using a three-Region approach and so on. Then a lot  
25 happened since then, and the Commission, in a Staff

1 Requirements Memorandum this year, approved the  
2 recommendations that the Staff made in SECY 00-0077.

3 They specifically rejected the elevation of the  
4 CDF goal beyond the fundamental level, among other things,  
5 and the Staff, following that SRM, has developed this policy  
6 statement, which, of course, abides by the Commission's  
7 wishes.

8 And Joe Murphy, a relative newcomer to this  
9 subject, is here today to explain to us, how life was  
10 created several thousand years ago.

11 [Laughter.]

12 DR. APOSTOLAKIS: Mr. Murphy?

13 DR. KRESS: Are we expected to have a letter on  
14 this subject?

15 DR. APOSTOLAKIS: I don't know. The Committee  
16 will have to discuss this. I have mixed feelings about it,  
17 but right now I'm inclined to say no, but we'll see, but I'm  
18 sure Joe will insist on a letter.

19 Mr. Murphy.

20 MR. MURPHY: Thank you. I thought a template that  
21 had a dark-colored border would be appropriate for this  
22 subject.

23 [Laughter.]

24 MR. MURPHY: I don't know how many times I've  
25 addressed the Committee on this subject, but it's got to be

1 pushing ten now.

2 DR. KRESS: You have to keep doing it till you get  
3 it right.

4 MR. MURPHY: I'm afraid you're right.

5 MR. LARKINS: The other didn't fit, Joe.

6 MR. MURPHY: I think George already gave most of  
7 the background. We proposed several modifications to the  
8 paper in SECY 00-0077. We discussed this with the Committee  
9 back in February.

10 The Committee, in turn, wrote a letter that really  
11 didn't address the specifics of what we had proposed, but  
12 told the Commission that, in fact, a different kind of  
13 policy statement was also needed.

14 I believe you referred to it as a risk-informed  
15 policy statement that would include the consideration of the  
16 three-Region approach, the concept of risk limits for  
17 individual plant applications, to be expressed in terms of  
18 CDF and LERF, and guidance on defense-in-depth to address  
19 uncertainties in the risk assessments.

20 The Commission, in turn, issued its SRM on June  
21 27th. They approved the modifications that we proposed with  
22 two exceptions: One is, they disagreed with the elevation  
23 of the qualitative statement on prevention of severe core  
24 damage accidents to a qualitative goal.

25 They disapproved that, but they also left a

1 statement in the policy statement. And they also  
2 disapproved the recommendation to include a statement that  
3 there be no adverse impact on the environment in the Safety  
4 Goal Policy Statement, directly, but did say we could put in  
5 some phraseology to consider the need to minimize adverse  
6 environmental impact in regulatory decisionmaking.

7 DR. KRESS: They didn't like that absolute value  
8 of no adverse?

9 MR. MURPHY: Yes. And I think what was there is  
10 that particularly Commissioner Merrifield was sensitive to  
11 the problems that EPA has run into with similar phraseology,  
12 and so they were -- it was a semantic problem, a legal  
13 problem.

14 The Commission, as I said, did give us essentially  
15 an additional phrase to put in that dealt with that subject  
16 without the no, and then directed that the Policy Statement  
17 of safety goals or goals not limit, which was also something  
18 that we had initially proposed.

19 That comes out of the June 15, 1990 SRM. As you  
20 are aware, what this is, you know in a way, is a  
21 housekeeping job. We've taken the information that's in the  
22 June 15, 1990 SRM, which is basically un-retrievable until  
23 we started this effort.

24 There were only a few paper copies that existed  
25 that didn't exist in electronic form. But it had probably

1 the best explanation of what the Commission really meant  
2 with its '86 policy statement. It's probably the longest  
3 SRM that's been written.

4 I think it's about 11 or 12 pages long. We tried  
5 to take the important stuff out of that and put it into the  
6 policy statement. We also updated the policy statement to  
7 reflect what's been going on in the last ten years of the  
8 PRA implementation plan, Reg Guide 1.174.

9 In any event, the modifications we made were  
10 consistent with the guidance we were given by the  
11 Commission. We reflect the plant-specific use of the safety  
12 goals as a definition of how safe is safe enough, as an  
13 aspirational goal, something you don't have to meet, but  
14 something you aim for, not a regulation.

15 We did maintain the use of the CDF as a subsidiary  
16 objective. That, in fact, came out of the June 15, 1990  
17 SRM, as opposed to the original policy statement.

18 We expanded the treatment of uncertainty, taking a  
19 portion of what's in Reg Guide 1.174. We're keeping that at  
20 the same high level that the rest of the policy statement  
21 was written in.

22 We incorporated the Commission's white paper  
23 definition of defense-in-depth; we deleted the reference to  
24 a general performance guideline, but did incorporate a new,  
25 a subsidiary goal for large early release frequency of ten

1 to the minus five per reactor year.

2 And we incorporated a statement expressing the  
3 Commission's intent to protect the environment, using the  
4 words that they had given us in their SRM.

5 DR. SEALE: Joe, you guys are awfully slippery  
6 sometimes, and so I want to see how you're going to slither  
7 with this one. In Bullet 2 on this thing, you speak of CDF  
8 as a subsidiary objective.

9 And in Bullet 5, you talk about LERF as a  
10 subsidiary goal. Now, are those the same thing?

11 MR. MURPHY: Yes, they both should be objectives.

12 DR. SEALE: Okay, because we've been goal'ing and  
13 objective'ing and so forth, back and forth, and I just  
14 wanted to make sure we didn't get a higher hierarchy or  
15 whatever.

16 MR. MURPHY: They're the same thing.

17 DR. WALLIS: How many points do you get for a  
18 goal, and how many do you get for an objective?

19 [Laughter.]

20 DR. APOSTOLAKIS: Where do you define how safe is  
21 safe enough? Is there a sentence somewhere here?

22 MR. MURPHY: Yes, there should be. I'd have to go  
23 back and look through to find the exact wording, but the  
24 attempt was to get the message into the policy statement  
25 that the safety goal expresses how safe is safe enough.

1 DR. APOSTOLAKIS: Yes, but there are also some  
2 pretty strong statements that the quantitative health  
3 objectives are not a substitute for existing regulations,  
4 right?

5 MR. MURPHY: Right.

6 DR. APOSTOLAKIS: You make that very clear?

7 MR. MURPHY: Yes.

8 DR. APOSTOLAKIS: So meeting these objectives,  
9 you're not safe enough.

10 MR. MURPHY: No.

11 DR. APOSTOLAKIS: You still have to go back and  
12 read all the regulations; isn't that correct?

13 MR. MURPHY: No. Let me go back to the concept of  
14 three reasons. The safety goal expresses a point where  
15 you're safe enough; you would not impose additional  
16 regulatory requirements.

17 Above that line, you might impose additional  
18 regulatory requirements, if they pass the backfit test. So  
19 if they are cost-beneficial as defined by 51.09, you can  
20 impose them in that region. And most of our regulations  
21 take us above the safety goal.

22 Above that, you have some area that the Commission  
23 has told us we're not ready to define yet, known as adequate  
24 protection. But between adequate protection and the safety  
25 goals is this region that it's cost-beneficial in licensing

1 actions.

2 So the safety goals are a goal.

3 DR. WALLIS: Yes, that's true.

4 MR. MURPHY: That's what you try to reach. But  
5 they're not a regulation; they're not something you have to  
6 reach; there's not a problem if you don't reach them.

7 DR. WALLIS: So what are you --

8 MR. MURPHY: They give you a goal as to when to  
9 stop regulating.

10 DR. WALLIS: That's it, they tell you when to stop  
11 regulating?

12 MR. MURPHY: They tell you how safe --

13 DR. WALLIS: So they have a negative effect on  
14 regulation; they tell you when to stop instead of where to  
15 go to? That's a very strange concept to me.

16 CHAIRMAN POWERS: It's always been. The entire  
17 idea was to decide when things were safe.

18 DR. WALLIS: In a game, it's to score a goal, not  
19 to stop at the goal line, and that's what I don't  
20 understand; I never did.

21 CHAIRMAN POWERS: The difficulty that you see --  
22 and you can see it in the Department of Energy -- is you  
23 have an uncapped continuous improvement kind of mentality.

24 And you keep honing away at things, and at  
25 tremendous cost, and it incapacitates you. So you get a

1 stagnation of activity.

2           The Commission really was searching very hard for  
3 something that would say, okay, we have done enough; these  
4 plants are safe enough; they meet the public mores on the  
5 tolerable amount of involuntary risk that they have to  
6 accept from these things.

7           DR. KRESS: So if they're above that level, then  
8 they're not safe enough, because that's how safe is safe  
9 enough?

10           CHAIRMAN POWERS: No, what they're saying is that  
11 there is no need to keep looking for ways to make them  
12 safer, if they had a probability of failure that was less  
13 than the goal.

14           Between the range of adequate protection and the  
15 safety goal, then you could look for ways to make them  
16 safer, provided you pass the backfit test, the cost-benefit  
17 test.

18           Above adequate protection, they were  
19 objectionable.

20           DR. KRESS: Joe used an interesting choice of  
21 words when he talked about adequate protection. He says  
22 we're not prepared to define what that is, what adequate  
23 protection is, yet. He put that word, yet, in there.

24           MR. MURPHY: Yes. I think we have -- several of  
25 us, and, I think, members of the Committee as well, have

1 thought long and hard about how to define this.

2 Of course, what you're defining is reasonable  
3 assurance of adequate protection, not just adequate  
4 protection.

5 DR. KRESS: Yes, that's true.

6 MR. MURPHY: And the problem is that this is a  
7 multidimensional thing. It is not measured entirely in  
8 terms of risk. I have my own personal example of this, and  
9 I'm not sure everybody would buy it, but I'll give you the  
10 example. Suppose we have a plant that has a core damage  
11 frequency of ten to the minus six and a LERF of the ten to  
12 the minus seven, and they haven't changed the plant.

13 We've reviewed the living devil out of the PRA; we  
14 are sure it's right, as sure as we can be. We believe we  
15 have an extremely safe plant.

16 And they arbitrarily take the feeling that, you  
17 know, we don't want resident inspectors anymore, so we want  
18 to throw them off the property.

19 As soon as that happens, the Commission would lose  
20 reasonable assurance of adequate protection, and under the  
21 adequate protection standard, we would take -- we would be  
22 able to issue an order saying you put our inspectors back on  
23 the site or you shut down.

24 DR. KRESS: Yes, but the other side of that coin  
25 is, suppose they are conforming with all the regulations,

1 doing a really good job in the inspection, passing all of  
2 the oversight colors, green, but their CDF is ten to the  
3 minus -- five times ten to the minus three?

4 That was, in our opinion, a place that ought to be  
5 incorporated into the concept of adequate protection, along  
6 with these other things, not make a quantitative CDF and  
7 LERF the measure of adequate protection, but include it.

8 And that's the other --

9 MR. MURPHY: I don't disagree with that. I think  
10 eventually we will have to do some sort of quantitative  
11 definition of adequate protection. I think that if you look  
12 at the -- not so much at the SRM, but at the vote sheets  
13 associated with the SRM.

14 Several of the Commissioners have a similar view,  
15 but they feel that we need to have more experience with what  
16 we're doing today and develop standards for PRA and know  
17 what we're talking about before we're ready to do that.

18 And I think when we do it, it will not be the  
19 answer -- it won't be sufficient, but it will be part of the  
20 definition, and I think that will come, but basically, the  
21 Commission has told us we're not ready yet, and I think  
22 they're right on that.

23 DR. BONACA: But it seems as if, you know, it  
24 still is expanding on the old definition that PRA will be  
25 used to fill gaps in the regulation. And that's really --

1 there is no reciprocity there.

2 The question is, well, there isn't any PRA there  
3 that has been performed on a plant, using margins recognized  
4 by the deterministic regulation, so we don't know what the  
5 PRA for a plant that just meets the regulation would give us  
6 for core damage frequency.

7 MR. MURPHY: Well --

8 DR. BONACA: For example, if I assume the  
9 containment only capable of meeting its design pressure,  
10 which is the requirement, I will get a different result in  
11 some of the LERF analysis I've had. That's just a simple  
12 example.

13 MR. MURPHY: Let me make a wild statement --

14 DR. BONACA: With the margins that we discussed,  
15 so I'm saying that still this is coherent with the old  
16 approach that PRA will be used just to fill gaps in the  
17 regulation.

18 MR. MURPHY: Yes. I'll make a controversial  
19 statement about what you just said. I've been asked the  
20 question a number of times, what -- if a plant just met the  
21 regulations, how safe would it be?

22 And my answer to that, basically, is that the core  
23 damage frequency would be zero.

24 The reason for that, the plant would never go  
25 critical.

1 DR. KRESS: Okay.

2 MR. MURPHY: Because of all the things that we  
3 don't regulate that are required for a power plant to  
4 operate and so if you just -- so it's difficult to say  
5 exactly where you are.

6 There are a few of them that were enacted on the  
7 basis of adequate protection. I believe the last time we  
8 did one on adequate protection was the PTS rule back around  
9 '76, '77. Most of them have been enacted -- since the  
10 backfit rule was initiated, most of them have been enacted  
11 under the backfit rule as cost beneficial actions.

12 Some of those perhaps could have been also  
13 justified as adequate protection but the backfit test --  
14 they could meet the backfit test and that was an easier  
15 argument to make.

16 What it means is that the regulations, the various  
17 parts take us to different levels of safety and what we are  
18 saying is when you are looking for relaxations you really  
19 ought to be looking for the cases where the regulations  
20 drove you well below the safety goals, because now you  
21 require them to be more than safe enough and this is an  
22 obvious area where you have room for relaxation, so think of  
23 the goal in that light as something you aim for. You don't  
24 don't have to meet --

25 DR. WALLIS: -- like adequate protection to me,

1 but something that you back off from when you go too far.

2 MR. MURPHY: Well, adequate protection, as we are  
3 using the term, means that if you had, if you lose  
4 reasonable assurance of adequate protection, the minute Sam  
5 Collins reaches the conclusion that he has lost adequate  
6 assurance of adequate protection there's only one action he  
7 can take. He shuts the plant down immediately.

8 He cannot let it operate when he doesn't have  
9 adequate protection, when he doesn't have reasonable  
10 assurance of adequate protection, but in between is the area  
11 where you would like to make -- it's like of like an ALARA  
12 principle. You would like to make it safer but you can only  
13 do so if it is cost beneficial, and we have the various  
14 guidelines to tell us how to do that cost benefit  
15 analysis --

16 DR. KRESS: But since adequate protection is  
17 multidimensional, like you said.

18 MR. MURPHY: Yes.

19 DR. KRESS: I am having trouble defining what the  
20 words "in between" mean. In between five dimensions -- I  
21 don't know what "in between" means.

22 The safety goals is one dimension.

23 MR. MURPHY: I can define it as long as I keep in  
24 that dimension that has one -- that acts as risk, but when I  
25 get into the other end then it gets harder and that's why

1 this question of how we define the three region. It may be  
2 a three region and five or six dimensional space before we  
3 are done, and that is going to be difficult to not only draw  
4 but also to explain.

5 DR. KRESS: Yes, that's the trouble about it.

6 That is why I wanted something that I could  
7 determine what in between meant.

8 DR. WALLIS: If you define it in terms of the  
9 actions the agency performs I can understand it -- if you  
10 cross this line we do this, if you cross this line we do  
11 that, if you cross this line we don't do anything.

12 I understand that. It is when you start getting  
13 into these words about defining these lines that I get very  
14 confused because --

15 DR. APOSTOLAKIS: See, in reality it is not just a  
16 matter of going above or below the line. That is the  
17 problem.

18 There are at least 19 PWR units now that have a  
19 CDF greater than the minus 4, right? Documented, according  
20 to their numbers, and the IPE is -- that's why I say at  
21 least, because if you go back and do some more stuff maybe  
22 others would, and yet they are not shut down.

23 I don't know that they are doing any studies to  
24 see whether they can reduce it. I suspect they are just  
25 happily going along and operating having met the regulations

1 and the Agency is not doing --

2 DR. SHACK: Planning a power uprate.

3 DR. APOSTOLAKIS: What?

4 DR. SHACK: Planning a power uprate.

5 [Laughter.]

6 DR. APOSTOLAKIS: Some of them are planning a  
7 planning uprate or a license extension.

8 CHAIRMAN POWERS: Not so much in PWR range. Life  
9 extension, yes, but power uprate --

10 DR. APOSTOLAKIS: So it is not a clear-cut thing.  
11 That is the whole point. I mean pushing the Agency to  
12 declare that if you are above or below you do certain things  
13 is no --

14 I have some questions that perhaps were answered  
15 20 years ago, but still, when you look at the first bullet,  
16 and maybe we can all look at Attachment 1. This is the  
17 goals, the document itself. It is Tab 15 of your book.

18 Attachment 1, Nuclear Regulatory Commission, 10  
19 CFR, Part 50 Summary:

20 "The qualitative safety goals are as follows.  
21 Individual members of the public" -- and so on -- "that  
22 individuals bear no significant additional risk to life and  
23 health."

24 And then for the societal risks we refer to viable  
25 competing technologies for producing electricity. I wonder

1 why we don't do that for individual risk as we did for  
2 societal.

3 Is that something that was resolved 20 years ago  
4 so we don't need to --

5 MR. MURPHY: Well, you know, these words are  
6 directly out of '86 --

7 DR. APOSTOLAKIS: I know, I know, but I am just  
8 curious. Do you remember?

9 I mean in one case we compare it with all those  
10 other risks and in the second case we make it specific to  
11 other means for generating electricity and I wonder what is  
12 the difference between individual risk and societal risk  
13 that requires that.

14 MR. MURPHY: Well, I think -- you know, I can  
15 speculate, George, and I remember those, writing them back  
16 in the '86 timeframe.

17 The only good news about the modification, and  
18 we'd only been on that for about three years, the first ACRS  
19 document that I remember seeing on the policy statement was  
20 dated 1980. It was the David Okrent report, and so the  
21 committee debated this for six years when it was coming out  
22 the first time.

23 Going back on that speculation, I think the first  
24 goal was to just say the impact of a nuclear plant on an  
25 individual should be minimal. It has no significant

1 addition to the risk that you have in your normal day to day  
2 life, but then they were worried about competing forms in  
3 energy.

4 They said -- and also it should not be an addition  
5 to society compared to any other energy source.

6 DR. APOSTOLAKIS: Yes, I mean that is what it  
7 says.

8 MR. MURPHY: But I think that is the message they  
9 were trying to get across. It's twofold.

10 If other energy sources were cheaper -- were  
11 safer, appreciably safer, this might not apply.

12 DR. WALLIS: But this doesn't make sense unless  
13 you have a measure of that.

14 DR. SHACK: An individual doesn't look at a cost  
15 benefit relation, because the individual that bears the cost  
16 may have no relation to the individual that gets the  
17 benefit.

18 DR. KRESS: Society --

19 DR. SHACK: Society as a whole has a cost benefit.

20 DR. WALLIS: But look, Joe, if you take this  
21 seriously, you have to then go out and measure the risk from  
22 these other ways of generating electricity and make a  
23 comparison and then make a decision based on that if that is  
24 your statement of principle, and I don't see the Agency  
25 doing that. It is just an empty statement unless it leads

1 to something, unless it is worked out in terms of some  
2 criteria, numbers, decisions.

3 MR. MURPHY: I think in terms of how the  
4 Commission went forward there were studies and they have  
5 both good and bad features -- they were done back in the  
6 '80s -- that attempted to estimate the risk from various  
7 forms of energy.

8 They have some flaws in them but you could get a  
9 feel, and I think what the Commission was saying when it  
10 issued this and now I am speculating, I am going back 14  
11 years to try to figure out what they were thinking and  
12 actually it's more like 20 years from the time the thing  
13 started, and I think if they felt they could not say the  
14 second statement that the risk to generating electricity by  
15 competing technologies, that the risk was not comparable to  
16 that, then you might well have had a different decision made  
17 by the Commission as to how far, when and how it regulated  
18 nuclear power.

19 DR. APOSTOLAKIS: I guess if I were to rewrite  
20 this, I would try to avoid reference to other --

21 DR. KRESS: Well, they did rewrite it. They  
22 rewrote it and called it the qualitative health objectives  
23 and then it disappears in that, doesn't show up. They did  
24 rewrite it.

25 DR. APOSTOLAKIS: I think that Graham is correct.

1 This is really an empty statement because the Agency never  
2 attempted --

3 DR. KRESS: Yes. That is why it doesn't show up  
4 when they do the qualitative health objectives, so they  
5 rewrote it.

6 DR. APOSTOLAKIS: This is a qualitative -- a  
7 quantitative --

8 DR. KRESS: This is a qualitative safety goal.

9 DR. APOSTOLAKIS: Right.

10 DR. KRESS: Then they convert it into qualitative  
11 health objectives and it disappears.

12 DR. APOSTOLAKIS: This is smooth.

13 DR. KRESS: Yes.

14 DR. APOSTOLAKIS: Now regarding the first one,  
15 individual members of the public -- such that individuals  
16 bear no significant additional risk to life and health. The  
17 way that this is interpreted in the quantitative goals  
18 later, the one-tenth of one percent and then it becomes a  
19 number, I believe we are taking the average risk from  
20 accidents over the whole country, right?

21 DR. KRESS: Yes.

22 DR. APOSTOLAKIS: Average over time, population --

23 DR. KRESS: Divided by the total population,  
24 right.

25 DR. APOSTOLAKIS: That is one way of interpreting

1 this.

2 DR. KRESS: That is the way it is interpreted.

3 DR. APOSTOLAKIS: How about another way that says  
4 if there is an earthquake in New York and Indian Point  
5 suffers a core meltdown that is sufficiently strong to do  
6 that, at the same time there will be no New York, so should  
7 I take now the allowed seismic risk for the plant and derive  
8 that from the fact that I have lost New York, because then I  
9 compare that there will be no significant additional risk,  
10 or should I still compare it with the average over the  
11 country?

12 In other words, there is a strong time element  
13 here.

14 MR. MURPHY: We pondered that question and it is  
15 not that simple.

16 [Laughter.]

17 MR. MURPHY: Nothing ever is. The real question  
18 is if you had the epicenter at Indian Point Manhattan might  
19 survive.

20 DR. APOSTOLAKIS: Yes.

21 MR. MURPHY: If you had the epicenter at Manhattan  
22 Indian Point might survive, so the question is you have got  
23 to fold in a whole bunch of distributions and try to figure  
24 out what it means.

25 DR. APOSTOLAKIS: Yes, sure, and you don't do it

1 on an epicenter by epicenter basis. You take the average  
2 horizontal ground acceleration with the plant, then you have  
3 all these maps that tell you what is the acceleration in  
4 other places.

5 CHAIRMAN POWERS: This has always been a  
6 puzzlement to me, and let me move away from Indian Point and  
7 Manhattan and move to Browns Ferry and Decatur.

8 If I have an earthquake such that Browns Ferry has  
9 a meltdown, you get a pretty strong motion then that might  
10 well affect Decatur, but the people that are going to be  
11 affected by the core meltdown aren't there. They are  
12 someplace else, and I don't think there is an earthquake big  
13 enough to affect them.

14 All their risk is going to come from the core  
15 meltdown.

16 DR. KRESS: They are going to be 50 miles away.

17 CHAIRMAN POWERS: Well, they are going to be  
18 within 10 miles --

19 DR. KRESS: Well, if you are talking about  
20 cancers, everybody will be 50 miles --

21 DR. APOSTOLAKIS: No, we limited that now to 10.

22 CHAIRMAN POWERS: We're within 10 miles and I mean  
23 there are not huge buildings crashing down. They may lose  
24 electrical power and the outhouse may be kicked over, but --

25 DR. KRESS: Well, that is a disaster.

1 [Laughter.]

2 CHAIRMAN POWERS: But I mean there's these  
3 horrible, these visions of all kinds of buildings collapsing  
4 and hospitals collapsing that you have from the Los Angeles  
5 earthquakes and things like that -- really doesn't affect  
6 them.

7 Most of those houses survive and they survive very  
8 large earthquakes, but they are still affected by the core  
9 meltdown and so to say that, well, the core meltdown of big  
10 earthquakes is a small perturbation -- not to them, it  
11 isn't.

12 DR. APOSTOLAKIS: Wait, wait, wait. I mean  
13 typically in a PRA to really have a major core meltdown you  
14 have to go significantly above the SSC level --

15 CHAIRMAN POWERS: Sure.

16 DR. APOSTOLAKIS: -- and whether you limit the  
17 consequences to 10 or 15 miles is really an artifact of the  
18 regulations. You have to look at the real risks.

19 If you are now at .45g horizontal acceleration, I  
20 don't know that you will have negligible impact on the  
21 nearby cities because the uniform building code does not  
22 require that residences and office buildings be designed  
23 against and SSC.

24 Those will be long gone before the record suffers  
25 a core meltdown.

1           Now there may be an issue of who is getting what  
2 but the real issue is when we say no significant additional  
3 risk to life and health, are we going to take into account  
4 these time dependent situations and maybe relax a little bit  
5 the requirements of the nuclear plant or the one-tenth of  
6 one percent applies no matter what? In which case we run  
7 the risk of shutting them down --

8           MR. MURPHY: The way that we have done it has been  
9 we applied the one-tenth of one percent.

10          DR. APOSTOLAKIS: I'm sorry?

11          MR. MURPHY: The way we have traditionally done it  
12 is apply the one-tenth of one percent. What we have done in  
13 things like seismic events, we have not assumed a large part  
14 of the population may be killed in the earthquake.

15          We have looked and said a large portion of the  
16 population may not be able to evacuate and we have evaluated  
17 it in those terms as we have done our PRAs. Above some g  
18 level we have assumed the bridges are down and you are not  
19 going to evacuate.

20          DR. APOSTOLAKIS: So you are always taking the  
21 pessimistic view, that all these known nuclear consequences  
22 can only hurt the nuclear accident, because now you cannot  
23 evacuate. You are taking a conservative approach in the  
24 PRA.

25          The fact that the guys may already be dead is not

1 taken into account.

2 MR. MURPHY: I don't think we would ever want to  
3 take a regulatory position that says we don't have to worry  
4 about the risk from great seismic events because everybody  
5 is going to be dead.

6 DR. APOSTOLAKIS: No. I understand that, but it  
7 is also a fact that a lot of these guys will be dead.

8 MR. MURPHY: Oh, yes.

9 DR. APOSTOLAKIS: Okay, so if we advertise PRA as  
10 a realistic assessment, I mean in this case we are taking a  
11 conservative approach, which may not be conservative enough  
12 in fact, if you bring other things into account.

13 The truth of the matter is that we are not taking,  
14 applying the one-tenth of one percent to these temporal  
15 events that may raise the average risk significantly for  
16 that part of the country.

17 DR. KRESS: My favorite phrase is we are not  
18 regulating a certain number of deaths. We are regulating  
19 risk.

20 DR. APOSTOLAKIS: That's right, and the risk is  
21 high for all the surrounding population during those times.

22 MR. MURPHY: Well, remember, you are looking at  
23 the risk, the probability and consequence.

24 The probability is exceedingly low that you are  
25 going to have a great earthquake in Decatur.

1 DR. APOSTOLAKIS: Right.

2 MR. MURPHY: So that the risk is small and we are  
3 still saying it may well be dominated by other causes.

4 DR. WALLIS: Can I ask you a simpler question?

5 DR. APOSTOLAKIS: Wait a minute. Can we resolve  
6 this?

7 DR. WALLIS: Well, okay, go ahead.

8 DR. APOSTOLAKIS: What is the answer? That we  
9 don't care?

10 DR. KRESS: Especially if it is in New York.

11 [Laughter.]

12 DR. APOSTOLAKIS: That these time-dependent  
13 changes in the background risk are really not -- are local  
14 effects. These are really local. I mean the average risk,  
15 individual risk to life and health becomes very high during  
16 those conditions, doesn't it?

17 DR. KRESS: No.

18 DR. APOSTOLAKIS: Does the probability of  
19 occurrence of the earthquake?

20 DR. KRESS: Yes, and that is what gets us out of  
21 this conundrum is the earthquake normally doesn't add --  
22 does not dominate the risk normally, so that you can have  
23 this --

24 DR. APOSTOLAKIS: It does not?

25 DR. KRESS: Normally it doesn't, so you can have

1 this inconsistency in terms of --

2 DR. APOSTOLAKIS: Which risk does it not dominate?  
3 The nuclear plant risk it dominates. That's what the PRAs  
4 say.

5 DR. KRESS: Not in my part of the country.

6 DR. APOSTOLAKIS: Doesn't the PRA say that in most  
7 plants --

8 MR. MURPHY: No, I think what you are missing is  
9 that you have to look at the conditional probabilities that  
10 falls to risk.

11 In some cases seismic risk is important, but when  
12 I look at it and say what is the chance of my having an  
13 accident and being killed?

14 Living in Maryland is probably non-earthquake --

15 DR. WALLIS: This is my question then. This  
16 second part, the easy part, this prompt fatality risk  
17 resulting from other accidents which members of the  
18 population are generally exposed, do you have any handle on  
19 that and is that site specific?

20 MR. MURPHY: What we have used to come up with  
21 that number is to go look at the accidental death rates in  
22 the United States.

23 DR. WALLIS: That is average for the whole  
24 population.

25 MR. MURPHY: Average for the whole population.

1 DR. WALLIS: So I don't see that you can apply any  
2 other criterion to the other one.

3 Otherwise, you're comparing two different things.  
4 If you want to be site-specific, you go to look at the risk  
5 of dying from gunshot wounds in Tennessee or something, and  
6 make it very specific. That's ridiculous.

7 DR. APOSTOLAKIS: Well, now the new statement does  
8 allow the use of safety goals on a plant-specific basis.

9 MR. MURPHY: Yes.

10 DR. APOSTOLAKIS: But it does not change the  
11 actual numbers.

12 MR. MURPHY: That's correct.

13 DR. APOSTOLAKIS: Which might be relevant to that.  
14 When you do it on a generic basis for the whole country,  
15 it's okay to take 1/10th of one percent of the average risk.

16 DR. WALLIS: But the average risk is quite  
17 different, that's what I'm saying.

18 DR. APOSTOLAKIS: The new thing now is that you  
19 can actually use them on a plant-specific basis, yet the  
20 comparison is to the average national risk.

21 MR. MURPHY: What we are really saying is that  
22 what we will operate off, basically, is subsidiary  
23 objectives.

24 DR. APOSTOLAKIS: Yes.

25 DR. KRESS: Absolutely.

1 MR. MURPHY: Core damage frequency and LERF.  
2 We'll apply those to individual plants.

3 There would be an argument if we talked that the  
4 risk was appreciably different, the risk to the population  
5 was appreciably different in one county than it is in the  
6 rest of the United States. There could be an argument that  
7 you'd need to change those numbers to reflect that.

8 But I don't think that exists, so you need to  
9 figure out --

10 DR. KRESS: You control that with your siting  
11 regulations to a certain extent. And what saves you from  
12 all of this is the fact that .1 percent, even if you apply  
13 it on a national basis, when you smear it out to any local,  
14 it's still pretty small.

15 I mean, you, of course, get variations locally,  
16 but it's still going to be a small fraction, if you do it on  
17 a national average; it's still going to be a small number.

18 DR. APOSTOLAKIS: Anyway, so there is no --

19 DR. KRESS: If you tried to do this on a local  
20 basis you'd have such a mess that I don't see how you could  
21 ever keep track of it.

22 DR. WALLIS: I think you need statements like  
23 this, because this is what the public might understand.  
24 What's my risk from nuclear power? If it's less than .1  
25 percent than from all other causes, that's an understandable

1 kind of statement.

2 DR. KRESS: I agree.

3 DR. WALLIS: If you say this plant has LERF of one  
4 point ten to the minus seven or something, they don't  
5 understand what on earth you're talking about. So you've  
6 got to put in these terms at some level.

7 DR. BONACA: One thing that I would like to point  
8 out just for the record, because it helps maybe in thinking  
9 about this, these goals were endorsed by the Commission in  
10 1986. But they were really proposed well before, and, for  
11 example, the AIF used them, and we used them for Millstone  
12 3, which was a high population density site.

13 And the NRC required a Level III PRA, and the  
14 statement was, you shall perform a Level III PRA; we will  
15 look at the results, and determine whether or not you need  
16 additional improvements. Site-specific was a specific  
17 issue.

18 The industry was very interested in the numeric,  
19 quantitative determination of this because they didn't want  
20 to have an open -- by which they are still coming in and  
21 saying, well, based on some criteria, we are going to impose  
22 this and that.

23 And at that time, all those units which were being  
24 evaluated for high density population risk, endorsed the EIF  
25 goals, which were exactly this, ten to the minus four, ten

1 to the minus five.

2 And they essentially said we will modify the plant  
3 to meet these goals, if we don't meet them.

4 I'm just mentioning this because it wasn't only  
5 that it came in as a regulatory document. There was a real  
6 negotiation there, and it was used by the industry to  
7 essentially draw a line and say this is good enough and we  
8 will not want to do more than that.

9 So, there is some historical perspective on where  
10 this line was drawn, and I'm not sure how much the  
11 Commission considered that.

12 DR. APOSTOLAKIS: They were at this for six years,  
13 so a lot of things --

14 DR. BONACA: Of course, but what I'm trying to say  
15 is, however, I just mentioned it because historically we had  
16 a reasonable way that it got there, and it was almost a  
17 negotiated line.

18 DR. APOSTOLAKIS: Now, moving on, the risk to the  
19 population, I mean, that's a mystery to me, how that's  
20 calculated. And one of these days, I'll find out. I think  
21 it's an individual risk, but --

22 DR. KRESS: They're both individual.

23 DR. APOSTOLAKIS: It's societal, to anybody else.

24 DR. KRESS: That's just a misnomer. They're both  
25 in there, in risk.

1 DR. APOSTOLAKIS: Okay. Can we change the  
2 misnomer then, or is it too late? Societal risk to  
3 everybody else means number of deaths.

4 DR. KRESS: It's not that, because they divide it  
5 by the population again.

6 DR. APOSTOLAKIS: Okay, we don't want to create a  
7 problem there.

8 MR. MURPHY: Well, we always change, but what I've  
9 tried to do as we went through this.

10 Going back and rereading it after about five  
11 years, I found that the 1986 policy statement was actually  
12 quite a good document. And it's amazing how forward-looking  
13 it was and how many of the insights from things like Reg  
14 Guide 1.174 were already in there.

15 It was really a masterpiece of work, so I tried to  
16 change it very little as I went through it.

17 DR. APOSTOLAKIS: I understand.

18 MR. MURPHY: Yes, we could get into that argument  
19 of societal risk, but it's societal risk averaged over a  
20 given distance. When you do the calculation, I agree, what  
21 you come up with is a --

22 DR. APOSTOLAKIS: Let me give you a few other  
23 comments because we have to get moving. Some of this  
24 discussion really took place years ago.

25 I still am a little bit confused by the statement

1 on page 5, real 5, not the handwritten, on the top.

2 The third paragraph from the bottom, the last  
3 line, the quantitative health objectives are not a  
4 substitute for existing regulations; we all see that.

5 Then on page 9, one of the changes is stated to be  
6 that the use of safety goals to define how safe is safe  
7 enough. And I'm a little bit confused now, and I think  
8 there is a question in here, but, Joe, maybe you can help  
9 me.

10 I mean, if the safety goals -- first of all, where  
11 does in this policy statement, we define how safe is safe  
12 enough? You say this is a change. Does it say anywhere,  
13 this is safe enough? I couldn't find it.

14 MR. MURPHY: What that statement on page 9, if I  
15 can find it --

16 DR. APOSTOLAKIS: Yes, that's the very last page  
17 where it says Summary of Changes.

18 MR. MURPHY: Yes.

19 DR. APOSTOLAKIS: Yes. Anyway, that's the first  
20 question. The second question is, if, indeed, the safety  
21 goals define how safe is safe enough, how can we claim that  
22 these goals are not a substitute for existing regulations?

23 In other words, if I convince you that I have met  
24 the goals, and the goals are safe, defined as safe enough,  
25 why aren't they a substitute for existing regulations?

1 DR. WALLIS: Because they went through the whole  
2 thing that goals and safe enough are completely different  
3 things.

4 DR. APOSTOLAKIS: Then maybe the statement that a  
5 change is -- the use of safety goals to define how safe is  
6 safe enough is not correct. That's not a change.

7 DR. KRESS: That how safe is safe enough is an  
8 abbreviation, and it should say how safe is safe enough so  
9 that NRC no longer imposes more regulations? That's the  
10 whole statement.

11 DR. WALLIS: How safe is safe enough to the public  
12 means the minimum standard.

13 DR. KRESS: I know, but that's what that term  
14 means.

15 DR. APOSTOLAKIS: It is intended to mean.

16 DR. WALLIS: But it's wrong. How safe is too  
17 safe?

18 MR. MURPHY: To respond to your question, where I  
19 tried to get that in was in the second paragraph of the  
20 first page.

21 DR. APOSTOLAKIS: Of the first page.

22 MR. MURPHY: Under summary.

23 DR. WALLIS: To the public, adequate protection  
24 and how safe is safe enough mean exactly the same thing.

25 DR. KRESS: That's right.

1 DR. APOSTOLAKIS: Let's let Joe finish his  
2 thought.

3 MR. MURPHY: Well, what we added was the safety  
4 goals are not limited goals.

5 DR. APOSTOLAKIS: Yes.

6 MR. MURPHY: The Commission believes the Staff  
7 should strive for a risk level consistent with the safety  
8 goals in developing or revising regulations.

9 DR. APOSTOLAKIS: And I like that.

10 MR. MURPHY: In developing and applying such new  
11 requirements to existing plants, the backfit rule should  
12 apply. So it doesn't say you have to be there; it says you  
13 use the backfit rule.

14 DR. APOSTOLAKIS: If you're above.

15 MR. MURPHY: If you're above, yes. You aim for  
16 that level, but if you can't get there without violating the  
17 backfit rule, you don't go there.

18 DR. APOSTOLAKIS: You don't go there; that's true.

19 MR. MURPHY: As long as you still believe you have  
20 reasonable assurance of adequate protection. The minute you  
21 think you don't have reasonable assurance of adequate  
22 protection, then they don't apply at all.

23 DR. BONACA: And that's a way to measure whether  
24 an outlier is worth to be dealt with.

25 DR. APOSTOLAKIS: As long as it's below adequate

1 protection.

2 DR. KRESS: And the problem is that there is no  
3 objective measure of what you mean by reasonable assurance  
4 of adequate protection.

5 DR. APOSTOLAKIS: Yes, we all agree to that. But  
6 there is no question about the thought on page 1. The  
7 question is whether it is correct that the use of safety  
8 goals to define how safe is safe enough is, in fact, a  
9 change. I don't think so.

10 MR. MURPHY: It is a change to this document. It  
11 is not a change in philosophy.

12 DR. APOSTOLAKIS: And it's consistent with the  
13 statement that the goals are not a substitute for existing  
14 regulations.

15 MR. MURPHY: Yes, I think so.

16 DR. SHACK: Go back to his Resident Inspector  
17 example.

18 DR. KRESS: That's exactly what that means.

19 DR. APOSTOLAKIS: I guess the problem is the same  
20 that Graham has. You can't call it safe enough. It's in  
21 the sense that you just described, safe enough; that if  
22 you're above, you go through the backfit rule to try to go  
23 below.

24 DR. KRESS: There's a lot of little baggage in  
25 there.

1 DR. APOSTOLAKIS: But it's not really safe enough.

2 DR. KRESS: Yes.

3 DR. APOSTOLAKIS: Safe enough means you don't do  
4 anything else.

5 DR. WALLIS: I think you really have to avoid the  
6 impression of weasel-wording.

7 DR. APOSTOLAKIS: I agree they should not be a  
8 substitute for regulations. I'm just trying to make the  
9 document self-consistent.

10 DR. WALLIS: You've got the baggage of all this  
11 history of interpreting words in an unusual way; that's the  
12 problem.

13 DR. SHACK: Well, the merciful thing is that  
14 nobody says safe enough in here, really. The statements are  
15 really much more carefully phrased.

16 DR. APOSTOLAKIS: Right, and this last little  
17 paragraph on page 9, is this 6, Summary of Changes, where  
18 this would be part of the statement?

19 MR. MURPHY: No.

20 DR. APOSTOLAKIS: Okay, this is not part of the  
21 statement?

22 DR. KRESS: No, that's just for --

23 DR. APOSTOLAKIS: What is the statement, by the  
24 way? Where does it start? The statement ends where it says  
25 for further information, contact...; is that the statement?

1 MR. MURPHY: Let me look. I'm in Attachment 2  
2 instead of Attachment 1.

3 DR. APOSTOLAKIS: Attachment 2 has the changes  
4 highlighted. These are the changes, but it doesn't tell me  
5 where the statement ends.

6 What is it that's going to appear in the --

7 MR. MURPHY: The thing that's labeled, 6, Summary  
8 of Changes Made in Revision 1, right now, I would leave that  
9 in, just to help somebody understand what the revision was,  
10 so I would leave that in.

11 But it's an explanatory thing to the changes,  
12 rather than part of the policy statement itself.

13 DR. APOSTOLAKIS: So where does the policy  
14 statement end?

15 MR. MURPHY: The policy statement would end right  
16 above it.

17 DR. APOSTOLAKIS: Everything above it?

18 MR. MURPHY: Yes.

19 DR. APOSTOLAKIS: By the way, where does this  
20 appear? Is it part of Part 50?

21 MR. MURPHY: It winds up in the Statements of  
22 Consideration associated with Part 50. The policy  
23 statements are not regulations, but they do appear in the  
24 Federal Register, and there's a -- in the looseleaf version  
25 of the regulations, there is a volume of Statements of

1 Consideration, which includes the statements that go with  
2 the rules when they're being enacted so you can help  
3 interpret what they mean, and it becomes a part of that  
4 document.

5 DR. APOSTOLAKIS: But they probably pick up the  
6 volumes that they keep receiving one every day now that says  
7 10 CFR Part 50, that's all.

8 MR. MURPHY: If you get the little white book, it  
9 won't be in there.

10 DR. APOSTOLAKIS: Okay.

11 MR. MURPHY: But the looseleaf version that they  
12 pass out that's volumes that are in --

13 DR. APOSTOLAKIS: There is one part that they're  
14 not getting.

15 DR. KRESS: George, what they should have done is,  
16 instead of calling that How Safe is Safe Enough? They  
17 should have called that Below Regulatory Concerns.

18 [Laughter.]

19 DR. APOSTOLAKIS: To avoid --

20 DR. KRESS: Right, that way there would be no  
21 controversy at all.

22 DR. APOSTOLAKIS: On page 7 -- and I'm going to be  
23 done soon, by the way -- on page 7, useful surrogate  
24 subsidiary objectives, right; are you there --

25 MR. MURPHY: Yes.

1 DR. APOSTOLAKIS: Right in the middle it says, in  
2 this light, the core damage frequency of less than ten to  
3 the minus four per year reactor pressure appears to be a  
4 very useful subsidiary benchmark. Is everybody happy with  
5 words like "appears to be"?

6 Why don't we say "is". We all know what "is" is.

7 [Laughter.]

8 DR. APOSTOLAKIS: My goodness, in the policy  
9 statement, appears to be -- you see, Joe?

10 DR. KRESS: Because the large early release  
11 frequency is a useful one.

12 DR. APOSTOLAKIS: Yes, is a useful one.

13 DR. KRESS: It's a little wishy-washy.

14 MR. MURPHY: I have no objection to the change you  
15 suggest.

16 DR. APOSTOLAKIS: You mean you can still make  
17 changes?

18 MR. MURPHY: It's always possible to make changes.

19 DR. APOSTOLAKIS: It depends on how difficult it  
20 is. I think it just struck me as I was reading it, "appears  
21 to be," my goodness --

22 DR. KRESS: We know it is.

23 DR. APOSTOLAKIS: We know all sorts of things with  
24 Regulatory Guide 1.174 and so on, and now we say it appears  
25 to be? I would propose to say "is."

1 MR. MURPHY: I have no objection.

2 DR. APOSTOLAKIS: Okay. Then, I must say that the  
3 discussion on Section 4, Treatment of Uncertainties, is a  
4 little bit aleatory. I mean, it doesn't have the --

5 DR. KRESS: Oblique, you mean?

6 DR. APOSTOLAKIS: -- coherence that one would  
7 expect from a document of this importance. For example, it  
8 says that the Commission has adopted -- on page 8 -- the use  
9 of mean estimates for purposes of implementing the  
10 quantitative objectives, blah, blah, blah, blah, blah.

11 And then it goes on and says use of mean estimates  
12 does not, however, resolve the need to quantify, to the  
13 extent reasonable, and understand those important  
14 uncertainties involved in the reactor accident risk  
15 predictions, which now, again, makes a separation between  
16 mean estimates and the distribution.

17 And the question is, can you get the mean if you  
18 don't have the distribution?

19 DR. APOSTOLAKIS: For an important document, this  
20 is not a very well-thought-out phraseology; let's put it  
21 that way.

22 MR. MURPHY: What I tried to do here was blend the  
23 discussion on uncertainties, which I actually thought was  
24 very good, that was in the earlier document with the  
25 information in 1.174.

1           So if you look at Attachment 2, you can see where  
2 the changes were made.

3           DR. APOSTOLAKIS: I mean --

4           MR. MURPHY: That's on page 8 of attachment 2.

5           DR. APOSTOLAKIS: This is also done in the ASME  
6 standard, and that was a comment the Committee made, how can  
7 you talk about mean values if you have not developed the  
8 distributions?

9           It's just that you take a point estimate and you  
10 declare it to be a mean value? And to put it here in a  
11 document of this significance, I --

12          MR. MURPHY: Well, the definition of mean values  
13 is from the original policy statements.

14          DR. APOSTOLAKIS: Original what?

15          MR. MURPHY: The definition that the safety goals  
16 apply to the mean is in the original policy statement.

17          DR. APOSTOLAKIS: That's correct; I do agree with  
18 that. But then going on and making a distinction that I can  
19 do all these mean values, but let's not forget that I also  
20 have to worry about the uncertainty, and then immediately  
21 you say, my god, he's making a distinction.

22          MR. MURPHY: I intended to say you're making the  
23 distinction.

24          DR. APOSTOLAKIS: I understand that.

25          MR. MURPHY: Like here we don't believe you can

1 get a mean without a distribution.

2 DR. APOSTOLAKIS: Exactly. So all I'm suggesting  
3 is to wordsmith this.

4 DR. KRESS: Try to sharpen up the wording.

5 DR. APOSTOLAKIS: Yes, to make sure that -- and  
6 you don't have to do it right now, but are you willing to do  
7 this?

8 MR. MURPHY: Of course. You know, what is the  
9 suggestion? I'll be glad to do it.

10 DR. APOSTOLAKIS: Then it goes on to the next  
11 paragraph where it talks about sensitivity studies. I have  
12 a problem with the sensitivity studies, but the results of  
13 sensitivity of studies -- we've got a typo here -- should be  
14 displayed, showing, for example, range variation and so on,  
15 depending on the decision needs the probabilistic results  
16 should also be reasonably balanced and supported through the  
17 use of deterministic arguments, defense-in-depth, and so on.

18 Is this language consistent with that of  
19 Regulatory Guide 1.174?

20 MR. MURPHY: I think it is. What I did is, I just  
21 added the phraseology at the end of the sentence you're  
22 referring to about defense-in-depth considerations,  
23 maintenance and safety margins, and pro forma management  
24 strategies. That was added.

25 The other words are from the original policy

1 statement.

2 DR. APOSTOLAKIS: All right. The last sentence is  
3 a little troublesome. This defense-in-depth approach is  
4 expected to continue to ensure the protection of public  
5 health and safety.

6 DR. KRESS: Well, one of these days, we're going  
7 to have to take up this question of uncertainties and  
8 sensitivities.

9 DR. APOSTOLAKIS: Yes.

10 DR. KRESS: What is always done in sensitivity  
11 analysis is vary the parameters one at a time while the  
12 range is about what they think is the baseline values to get  
13 the importance of each one.

14 But that's supposedly done at what might be called  
15 the mean. But those numbers change all over the map, and if  
16 you get off on the curve a little bit, you move up, you get  
17 a different sensitivity, and it's not an appropriate way to  
18 really conduct a full sensitivity analysis.

19 And one of these days, we ought to have that on  
20 our agenda to discuss.

21 DR. APOSTOLAKIS: Right, right. Also, I don't  
22 think it's really true that the Commission is making its  
23 decisions using the mean estimates. I mean, there is much  
24 more at stake here.

25 DR. KRESS: They use the point estimates coming

1 out of the PRA.

2 DR. APOSTOLAKIS: You start out with the means,  
3 but then you look at other things, defense-in-depth. You  
4 look at --

5 DR. SHACK: You use mean estimates for comparison  
6 with these objectives.

7 DR. APOSTOLAKIS: Yes, but then you have shades of  
8 gray.

9 I don't know but there are certain -- I was  
10 surprised, for example, by the first paragraph under Section  
11 5. The Commission recognizes that a safety goal can provide  
12 a useful tool by which the adequacy of regulations regarding  
13 changes can be judged.

14 Likewise, the safety goals could be of benefit in  
15 the much more difficult task of assessing whether existing  
16 plants -- and so on, comply with -- conform adequately with  
17 the intent of the safety goal policy.

18 DR. KRESS: That's confusing; isn't it?

19 MR. MURPHY: Those are words from the '86  
20 statement.

21 DR. APOSTOLAKIS: Can we either take them out or  
22 --

23 MR. MURPHY: We can take them out. What I tried  
24 to do here was not to do too much violence to the '86  
25 statement, except where there was later guidance that would

1 change it.

2 DR. APOSTOLAKIS: But, Joe, it's not much more of  
3 a difficult task any more. See, at that time, there was  
4 concern that, you know, maybe we can't use the new animal of  
5 PRA to assess what we've been doing with the plants, but 20  
6 years later, I think everybody is comfortable with the idea.

7 MR. MURPHY: I have no problem with taking that  
8 out.

9 DR. APOSTOLAKIS: Okay, or rephrase it at least.

10 MR. MURPHY: I have not problem.

11 DR. APOSTOLAKIS: Oh, I also saw for the first  
12 time, on page 9, a word that I had not seen before. In the  
13 paragraph just above Section 6, second line, "nuclear power  
14 plant permittees and licensees."

15 I thought they were all licensees.

16 DR. KRESS: No, you've got permits in the NMSS  
17 area and permits for construction.

18 DR. APOSTOLAKIS: But this is for nuclear power  
19 plants.

20 DR. KRESS: Well, if you're under construction,  
21 you get a permit.

22 DR. APOSTOLAKIS: So this is a hopeful document.  
23 It hopes. Okay, permittees then.

24 I don't know, I could argue about little details  
25 in the last two Sections, 4 and 5, but I'm not sure it's

1 worth it.

2 So, now, Joe, are you promising to go back and  
3 look at the stuff you said you have no objection to doing?  
4 Because that will depend on whether -- actually, our  
5 decision on whether to write the letter or not.

6 MR. MURPHY: Depending on the constraints on the  
7 Committee, if you have time to write a letter, it would help  
8 me make sure I get the changes you want in there.

9 But certainly, based on what I heard today, you've  
10 given suggestions that I will try to incorporate into the  
11 changes.

12 The paper right now is at the various Offices for  
13 concurrence, and I'm sure there are going to be some changes  
14 coming out as a result of that process. I've never taken a  
15 document to the lawyers without having them change  
16 something, and I suspect that will be true, particularly for  
17 OGC again.

18 And I'm glad to incorporate the ones that I think  
19 I agreed to today. The letter helps me make sure that we're  
20 both talking on the same wavelength. But that's your  
21 choice.

22 DR. APOSTOLAKIS: Yes.

23 MR. MURPHY: Certainly, I would prefer a letter,  
24 but I understand the constraints that the Committee operates  
25 under as well.

1 DR. APOSTOLAKIS: A letter, could it be a  
2 Larkins-gram, a little note referring to the transcript?

3 DR. KRESS: A letter that spells out the  
4 specifics. That's normally documented.

5 CHAIRMAN POWERS: If it's going to have any  
6 technical content to it, it has to be a letter.

7 DR. APOSTOLAKIS: Well, first of all, are there  
8 any other comments from the members?

9 DR. SEALE: It can be a letter, though, and not a  
10 report.

11 CHAIRMAN POWERS: This would be a letter.

12 DR. APOSTOLAKIS: Well, how do the members feel?

13 DR. KRESS: I think, personally, that Joe can  
14 remember most of the things you said, and take care of it  
15 without a letter, but --

16 DR. APOSTOLAKIS: It's not Joe. I never  
17 understood why this Committee on generic requirements,  
18 reviews all these documents after us, and actually makes  
19 changes to things we have approved.

20 I never understood that. It happened before to  
21 Regulatory Guides.

22 DR. SEALE: It just lets you know where you sit.

23 DR. KRESS: If you can, we'll write a letter,  
24 George.

25 DR. APOSTOLAKIS: I'm not willing to write a

1 letter.

2 DR. SHACK: Well, that settles it.

3 DR. KRESS: I agree with most of your comments.

4 DR. APOSTOLAKIS: Yes. Does anyone feel we have  
5 to write a letter? This is a very important document, by  
6 the way, that will be forgotten after it's published, but  
7 it's very important.

8 MR. MARKLEY: George, within the context of a  
9 Larkins-Gram, you could say something to the effect, you  
10 know, that you support the change, and that the Staff agreed  
11 to make certain changes.

12 DR. APOSTOLAKIS: And then refer to the  
13 transcript. Can we do that?

14 MR. MARKLEY: I wouldn't refer to the transcript.  
15 I'd just say that they agreed to make certain changes;  
16 therefore, you have no objection or something like that.  
17 That's about the extent of it.

18 DR. APOSTOLAKIS: Can we say that?

19 MR. MARKLEY: Yes.

20 DR. APOSTOLAKIS: I would much rather do that.

21 DR. SEALE: Joe, can you defend these rash changes  
22 that you've volunteered to make, without a letter?

23 MR. MURPHY: Oh, I think so. I'll still use the  
24 Committee's name in vain. It would be helpful, George, if  
25 you could give me at least a handwritten note as to what you

1 think I agreed to, so we have some sort of --

2 DR. APOSTOLAKIS: There's the transcript.

3 MR. MURPHY: I mean, I'd have the transcript, but  
4 I'd like to start on it kind of immediately.

5 DR. APOSTOLAKIS: Oh. Can I do that?

6 DR. KRESS: Sure.

7 MR. MARKLEY: That these are George's suggested  
8 changes and not the Committee's, though; that's the only  
9 distinction.

10 DR. KRESS: We could even take a vote on whether  
11 the Committee agrees to them.

12 DR. APOSTOLAKIS: You mean I should bring them to  
13 --

14 DR. KRESS: Just give them as your comments.

15 MR. MURPHY: I will be glad, when the transcript  
16 comes out, to go over the transcript and make sure that's  
17 what's in there is what I agreed to with the Committee.

18 MR. SIEBER: The transcript is just comments, and  
19 that's no different than if George just pencils them out.

20 DR. KRESS: That's right, it's the same thing.  
21 George could include some of the ones that he didn't bring  
22 up, if he wanted to.

23 DR. APOSTOLAKIS: Well, what we can do is, I can  
24 xerox the marked copy here and give it to you.

25 DR. KRESS: Why don't you do that.

1 DR. APOSTOLAKIS: And then you and I can -- can we  
2 do that?

3 DR. KRESS: Yes.

4 DR. APOSTOLAKIS: Okay.

5 MR. MURPHY: Just let me get an earlier start and  
6 get it to the Program Offices for their review earlier.

7 DR. APOSTOLAKIS: Are there any other comments,  
8 suggestions by the members?

9 DR. KRESS: Yes. I think we lost the battle.

10 DR. APOSTOLAKIS: Yes.

11 DR. KRESS: And I hope we don't lose the war,  
12 though. I think we ought to stick to our guns and leave the  
13 Safety Goal Policy Statement alone. It's a sacred document;  
14 it's cast in iron now.

15 And we can talk about the needs for a policy  
16 statement on risk-informed regulation or something like that  
17 that still incorporates these concepts we've mentioned.

18 DR. APOSTOLAKIS: The three-Region approach?

19 DR. KRESS: Yes.

20 DR. APOSTOLAKIS: Well, they have not rejected the  
21 concept. They just say it's --

22 DR. KRESS: It's just a big deal to change the  
23 Safety Goal Policy Statement, and it's really not needed in  
24 there. It's not the place -- it doesn't belong in there.  
25 I've changed my mind on that. It really belongs in a policy

1 statement on risk-informing regulations or something, which  
2 we don't really have a policy statement on, by the way.

3 DR. APOSTOLAKIS: We do have a de facto --

4 DR. SEALE: So you really changed the war, you've  
5 just defined or redefined your terms of peace.

6 DR. APOSTOLAKIS: I think as your CDF goes to, you  
7 know, values of two, three, ten to the minus three and  
8 above, you are now in the region of inadequate protection.

9 DR. SEALE: Yes.

10 DR. APOSTOLAKIS: And I think the Staff acts that  
11 way, but I guess --

12 DR. KRESS: But it's de facto.

13 DR. APOSTOLAKIS: It's a de facto thing. When you  
14 look at the history of the Agency, anytime we find something  
15 that's above those numbers, immediately there is action.  
16 What's going on?

17 Anyway, is there anything else?

18 DR. LEITCH: Just a small typo, page 5, line 5, in  
19 the smooth version. It says file industry, and I think it's  
20 just meant to be --

21 MR. MURPHY: Where was that?

22 DR. LEITCH: The smooth version, page 5, line 5.  
23 I'll point it out to you.

24 MR. MURPHY: Oh, yes, thank you.

25 DR. APOSTOLAKIS: Okay, so this session is 21

1 minutes ahead of schedule. Back to you, Mr. Chairman.

2 CHAIRMAN POWERS: Thank you very much, and we will  
3 recess until 10:15, and we can dispense with the  
4 transcription at this point.

5 [Whereupon, at 9:40 a.m., the meeting was  
6 recessed, to reconvene in an unrecorded session.]

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CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: 478th ADVISORY COMMITTEE  
ON REACTOR SAFEGUARDS  
(ACRS)

Case Number:

Place of Proceeding: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission transcribed by me from recorded tapes provided by the Nuclear Regulatory Commission, and that the transcript is a true and accurate record of the foregoing proceedings to the best of my belief and ability.



Rose Gershon

Transcriber

Ann Riley & Associates, Ltd.

# Modifications to the Safety Goal Policy Statement

Joseph A. Murphy  
Office of Nuclear Regulatory Research

## Background

- In SECY-00-0077 (3/30/2000), staff proposed several modifications to the safety goal policy statement.
- Discussed with ACRS on Feb. 3, 2000.

# Background

- ACRS letter of 4/17/2000 recommended:
  - Consideration of a "three-region approach" that defines CDF and large, early release frequency (LERF) boundaries that would be consistent with "adequate protection" and that would define "how safe is safe enough."
  - The concept of risk limits for individual plant applications. These risk limits would be quantitatively expressed limits on CDF and LERF and would possibly consider additional limits for societal risk, land contamination, and a cap on temporary changes in risk.
  - Guidance on defense in depth to address uncertainties in the risk assessments.

# Commission SRM

- By SRM dated 6/27/ 2000, Commission approved modifications proposed in SECY-00-0077, with two exceptions:
  - Elevation of the qualitative statement of prevention of severe core damage accidents to a qualitative safety goal was disapproved.
  - Commission also disapproved recommendation to include the statement there be no adverse impact on the environment in the safety goal policy statement.

## Commission SRM

- The Commission supported expressing the Commission's intent to protect the environment and to consider the need to minimize adverse environmental impacts in its regulatory decision-making.
- The Commission directed that the policy statement state that safety goals are "goals" and not limits.

# Modifications to Policy Statement

- Staff has proceeded as directed to modify the policy statement in accordance with SRM:
  - Reflect Plant-Specific Usage of Safety Goals and definition of “How Safe is Safe Enough”.
  - Maintain CDF as a subsidiary objective.
  - Expand treatment of uncertainty, using R.G. 1.174.
  - Incorporate Commission’s White Paper definition of defense-in-depth.
  - Delete reference to a general performance guideline. Incorporate a Large Early Release Frequency subsidiary goal of  $10^{-5}$  per reactor year.
  - Incorporated a statement expressing the Commission's intent to protect the environment, and indicating that the NRC considers the need to minimize adverse environmental impacts in its regulatory decision-making.

## Proposed Modifications

- Package to ACRS includes a line-in line-out version so exact changes can be evaluated.
- This version also includes references so that the source of the new material added can be ascertained.