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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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479TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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FRIDAY

FEBRUARY 2, 2001

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ROCKVILLE, MARYLAND

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The Advisory Committee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., Dr. George Apostolakis, Chairman, presiding.

COMMITTEE MEMBERS:

GEORGE APOSTOLAKIS	Chairman
MARIO V. BONACA	Vice Chairman
THOMAS S. KRESS	Member
GRAHAM M. LEITCH	Member
DANA A. POWERS	Member
ROBERT L. SEALE	Member
WILLIAM J. SHACK	Member

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COMMITTEE MEMBERS: (CONT.)

JOHN D. SIEBER Member

ROBERT E. UHRIG Member

GRAHAM B. WALLIS Member

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AGENDA ITEM

PAGE

Regulatory Effectiveness of the Anticipated
Transient Without Scram (ATWS) Rule
Overview of the Mixed Oxide Fuel
Fabrication Facility
Statement of Chairman Meserve

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

(8:29 a.m.)

1
2
3 CHAIRMAN APOSTOLAKIS: The meeting will
4 now come to order. This is the second day of the
5 479th meeting of the Advisory Committee on Reactor
6 Safeguards.

7 During today's meeting the Committee will
8 consider the following: regulatory effectiveness of
9 the ATWS rule, other view of mixed oxide fuel
10 fabrication facility, NRC safety research program,
11 future ACRS activities, report of the planning and
12 procedure subcommittee, reconciliation of ACRS
13 comments and recommendations, proposed ACRS reports.

14 In addition, the Committee will meet with
15 NRC Chairman Meserve at 1 o'clock to discuss topics of
16 mutual interest.

17 This meeting is being conducted in
18 accordance with the provisions of the Federal Advisory
19 Committee.

20 Mr. Sam Duraiswamy is the designated
21 federal official for the initial portion of this
22 meeting.

23 We have received no written comments or
24 requests for time to make oral statements from members
25 of the public regarding today's sessions. A

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1 transcript of portions of the meeting is being kept
2 and it is requested that the speakers use one of the
3 microphones, identify themselves and speak with
4 sufficient clarity and volume so that they can be
5 readily heard.

6 I would remind the Members that we have
7 interviews with candidates during lunch time. We also
8 have cake and coffee for Bob Seale at 12:45 in the
9 subcommittee room.

10 MR. SEALE: The rest of you are invited.

11 (Laughter.)

12 CHAIRMAN APOSTOLAKIS: Including the
13 Chairman. And please review the reconciliation items,
14 No. 14. Each of you must have a copy because we want
15 to go over it quickly later on.

16 The first item is regulatory effectiveness
17 of the ACWS rule.

18 Doctor Kress, will you lead us through
19 this?

20 MR. KRESS: Thank you. If you recall, the
21 former AEOD part of research has been engaged in the
22 activity of a retrospective look at some of the
23 regulations to determine whether they accomplished
24 what we thought they would and whether the regulatory
25 analysis process has worked correctly and we

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1 previously reviewed one of these looks. It was the
2 Station Blackout rule a few months ago. I don't
3 remember exactly when. This is the second one and the
4 idea is to look at this and see if it's accomplished
5 what it intended to and see if the regulatory analysis
6 was valid and to see if there are any lessons learned.
7 It sounds like a real good idea to me. So with that
8 I'll turn it over to Jack Rosenthal.

9 MR. ROSENTHAL: Thank you. My name is
10 Jack Rosenthal, Research. And Farouk Eltawila, my
11 Division Director is also in the room.

12 I just want to make the point before we
13 start, although this originally started as an AEOD
14 activity, one of the -- as a direction setting issue,
15 it's now been incorporated as an RES function and we
16 have a regulatory effectiveness team which is looking
17 at rules and other matters and we intend to continue
18 looking at rules or regulatory processes at a rate of
19 about two a year.

20 Let me say no more. George Lanik is the
21 team leader of the Reg Effectiveness and Operating
22 Experience Team. And Bill Raughley who will be the
23 principal spokesman is also a member of that team.

24 MR. POWERS: Jack, let me ask you a
25 question. When you say "team" that seems to hint that

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1 maybe this group of people looking at regulatory
2 effectiveness comes from organizations other than RES.
3 Is that a correct assumption?

4 MR. ROSENTHAL: No. We've just gone to,
5 instead of sections, where section leaders have
6 administrative functions, to smaller teams where the
7 team leaders can spend more of their time on technical
8 matters and less on administrative matters.

9 MR. POWERS: I had the sense without
10 attributing why we got that sense, that maybe the
11 enthusiasm for the re-examination of these rules like
12 the ATWS and the Station Blackout is not universally
13 high with the Agency.

14 MR. KRESS: No comment?

15 MR. ROSENTHAL: Actually, I got some good
16 feedback on the blackout rule. Bruce Boger was one
17 who, in particular cornered me and said hey, here's a
18 good example of the Agency being able to be
19 introspective and examine itself and he wanted to take
20 credit for it as one of our self-assessments that we
21 promised to do in the strategic plan.

22 And a number of people listened to the
23 issues in the blackout and we got some change already
24 in the inspection program. So I think it went well
25 and I know on the ATWS, we're now working with NRR and

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1 they're quite receptive to what we have to say
2 technically.

3 MR. SEALE: Is there any predisposition or
4 policy decision that would limit the membership on
5 these teams to people on RES?

6 MR. ROSENTHAL: No. If I can arrange to
7 get some help, I'd like that.

8 MR. SEALE: I'm thinking, for example,
9 rules that might have a high inspection element in
10 them that where some help from some qualified
11 inspection people from the regions could be extremely
12 useful and I know we've been in the past been
13 connected with the efforts that some of those people
14 have made contributions they've made in other areas.

15 MR. ROSENTHAL: Sounds good. No, you're
16 right. We'll try that on the next ones.

17 MR. LANIK: As Jack said, my name is
18 George Lanik. I'm a Team Leader for this activity.
19 I think Dr. Kress gave us a pretty good introduction.
20 One thing I'd add is these studies basically, the
21 reason we picked the studies we have so far is that
22 they were listed in the IPE inside report as those
23 which are continue to be risk contributors and we're
24 sort of doing them based on that.

25 The other point I'd like to make about

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1 Research's responsibilities and independent assessment
2 is that we also have some role in independent review
3 of operating experience and I think because at least
4 one aspect of these studies is a looking at the
5 operating experience. We think that also contributes
6 to that role for Research.

7 On a more technical level, I'd like to
8 make two points about these studies. First of all,
9 the -- if you look at any of these rules, it's really
10 a very short version that you see in the Code of
11 Federal Regulations and you have to go back and look
12 at the background information including the statement
13 of considerations and other documents that were
14 developed at the time these things were implemented to
15 get what they really intended to accomplish.

16 And in particular for this one, if you
17 read the rule you see that all the PWRs had to install
18 both an automatic driven trip and automatic emergency
19 feed water initiated, but only CE and B&W had to
20 installed the so-called diverse scram system which is
21 a totally diverse system to the normal RPS. And none
22 of that's -- the reason for any of that is not
23 mentioned in the rules so you have to go back and look
24 to see that there were design considerations for why
25 that was true at the time.

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1 And that had to do with the fact that if
2 you did the analysis of these plants and the pressures
3 they would reach during an ATWS event where the CE and
4 B&W plants would typically go above this 3200 pound
5 pressure limit which was the -- a design pressure
6 which they thought would start -- you might start
7 seeing some damage. And in the case of Westinghouse
8 with the design conditions they were operating at that
9 time, they would only exceed that pressure for about
10 1 percent of the cycle time. So that was one of the
11 considerations in that rule.

12 The second point I'd like to make is that
13 in the type of risk analysis that we're using in this
14 report, basically what we're doing is we're saying
15 that the risk is the frequency at which during an ATWS
16 event you will exceed that 3200 pounds. We are not
17 using the measure of poor damage probability or large
18 early release. This is the same measure that was used
19 in the initial decision to make about the ATWS rule.

20 And the other point is that we're using
21 the same basic models that were used then. And one of
22 the reasons for that is that we wanted to show that
23 what the improvements that have been made have been
24 improvements in the operations and equipment
25 performance rather than improvements in the PRA model.

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1 And secondly, in a lot of cases it's easier to
2 understand and you can get a better idea of the big
3 picture if you have the simpler model than the
4 complicated model.

5 MR. KRESS: Is it all right for us to
6 equate this probability of exceeding this pressure
7 with a core damage frequency? The core damage
8 frequency would be less than that, but --

9 MR. LANIK: I think what you can say is if
10 you don't exceed 3200 pounds, I don't think anybody is
11 claiming that there will be any core damage.

12 If you do exceed 3200 pounds, there is
13 some probability and the other thing is with the
14 thermal hydraulics the way they are, it's very
15 difficult to calculate exactly what that is, so you
16 know, if you only go 100 pounds above that, you're
17 probably not going to damage any valves or anything to
18 cause a problem. But if you exceed it by 500 pounds,
19 you probably are going to damage some equipment that
20 you would need to mitigate and prevent core damage.

21 You haven't reached core damage by the
22 time you've hit that point, of course. It will happen
23 some time afterwards based on damage to equipment and
24 being unable to respond --

25 MR. KRESS: But in thinking of the risk

1 implications it would be --

2 MR. LANIK: Yes, it's a surrogate measure.

3 MR. KRESS: It would be a surrogate --

4 MR. LANIK: Obviously, it's going to be a
5 little less.

6 MR. KRESS: Yes.

7 MR. LANIK: So without further ado, I'm
8 going to -- Bill Raughley's going to take us through
9 the major findings of the study including discussions
10 of the background and methodology, some of the
11 technical details and the basic conclusions.

12 MR. RAUGHLEY: I am Bill Raughley, I'm a
13 senior engineer in Research and I've prepared a half
14 a dozen slides that I didn't get stapled. They have
15 the same orientation in the packet. Sorry about that.

16 Anyway, it's about a 25 to 30 minute
17 presentation and we have slides on the background, the
18 assessment, the results, some of the highlights of the
19 conclusions or the comments received from the industry
20 and the conclusions in the report.

21 We'll spend a little time on the
22 background just to get every start simple and work up
23 to some of the details you need to know to understand
24 the results in the conclusion.

25 We are talking about the draft report

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1 mentioned there. That was issued in October 2000 for
2 internal and external comment and we've received the
3 last of the -- we received all of the internal
4 comments in December of 2000 and we received all the
5 external comments as of about two weeks ago.

6 And that was just to define an ATWS and
7 it's defined in 10 CFR 50 as an expected operational
8 transient which is accompanied by a failure of the
9 reactor trip portion of the protection system and the
10 reactor trip portion includes the RPS system itself,
11 the control rods and the control rod drive mechanisms.

12 ATWS is usually discussed in terms of the
13 three factors I've listed there, the initiation event
14 frequency, the RPS reliability and the mitigating
15 systems and it's usually also discussed by PWR type,
16 Westinghouse, CE and B&W and the GE BWR type. So all
17 three of these factors are discussed individually for
18 those different reactor types.

19 The ATWS rule was first detailed in 1973
20 in WASH 1270. Soon after the Commission made it an
21 unresolved safety issue A9. In response to that
22 issue, the staff prepared NUREG 460 which is four
23 volumes and 18 appendices which detail the
24 deterministic and probabilistic analysis associated
25 with ATWS. That report relies heavily on the

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1 manufacturer's analyses for deterministic input and
2 then our own -- and in conjunction with the industry
3 some probabilistic assessment.

4 Pivotal to the ATWS issue and through the
5 whole discussion of 460 there was considerable
6 discussion or disagreement about the value of the RPS
7 reliability. If you look in 460 it ranges from 10^{-12}
8 up to 10^{-4} and they agree to disagree over the range
9 being 10^{-4} to 10^{-6} .

10 MR. KRESS: It's hard to measure that,
11 isn't it?

12 MR. RAUGHLEY: And that was -- the
13 discussion was over the inclusion or exclusion of
14 data, whether you look at it just in the U.S. and
15 include foreign experience and whether we even had all
16 the experience because the RPS system failures aren't
17 all reportable.

18 MR. LEITCH: I notice in the table here
19 that River Bend, for example, has an ATWS core damage
20 frequency 1 times 10^{-10} . Is that a difference in
21 interpretation?

22 MR. RAUGHLEY: On the BWRs that was one of
23 the findings or conclusions of the report. On the
24 BWRs there's a very large variation in the human error
25 probability. It ranges from .5 up to 1 in 10,000.

1 There's a very wide range and largely the answer you
2 get on the BWRs is dependent on what value you select
3 for operator.

4 MR. LEITCH: So the BWR, of course, and
5 that was very sensitive to operator actions and --

6 MR. RAUGHLEY: Yes.

7 MR. LEITCH: That difference --

8 MR. RAUGHLEY: I would just guess that
9 Riverbend used 10^{-3} or 10^{-4} for operator.

10 MR. LEITCH: So it's not physical hardware
11 that's different. It's rather a different assumption
12 about operator action --

13 MR. RAUGHLEY: Yes, and that's one of our
14 principal conclusions.

15 MR. LANIK: However, there are two sort of
16 two different approaches to BWRs. One of them --
17 there are a couple of plants out there, the BWRs that
18 actually installed an automatic SLC.

19 MR. RAUGHLEY: High capacity SLC and those
20 don't rely so much on the human performance and they
21 would do better.

22 MR. WALLIS: What sort of experiment would
23 you do to assure yourself of the probability of a
24 human error was of the order of 10^{-4} ?

25 MR. RAUGHLEY: Jack, can you take that?

1 MR. ROSENTHAL: We observe that in the IPE
2 analysis which included ATWS that there was a wide
3 range of human factors. In fact, I don't know how to
4 affirm such a low value and the conclusion, really and
5 I'm jumping all the to the conclusion is that when you
6 do a rule and in that rule you're heavily reliant on
7 human actions, then now in retrospect and retrospect
8 is always 20-20, you should recognize that 10 to 15
9 years later, you're not going to be able to confirm
10 that the rule is being met within some uncertainty
11 events.

12 MR. ELTAWILA: This is Farouk Eltawila.
13 To answer your question, I think there are the
14 training center in Chattanooga and things like that
15 that run this type of scenarios and they watch the
16 performance of the operator and there have been a lot
17 of data collected in the Halden Project for ATWS
18 scenario although that was for pressurized water, but
19 they observed the operator and it's a training tool to
20 respond to ATWS event because it has a unique feature
21 that the operator does the counter intuitive things.
22 He has to lower the level of the water in the core, so
23 that's why it makes it extremely difficult compared to
24 other scenarios. But there have been a lot of
25 collection of data on ATWS either through the training

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1 centers or through the Halden Project.

2 MR. KRESS: Let me ask you a question
3 about -- you're next -- about the BWR, human error
4 versus the automatic actuation of the SLC.

5 In the -- when I looked at the event trees
6 for those two issues that you had in the report, the
7 automatic didn't have a line for failure of the SLC,
8 whereas the one with the operator action did.

9 It did occur to me that the failure rate
10 of this automatic is probably about the same as this
11 operator action failure rate, if it's really that low
12 and I was wondering if you actually looked at the
13 comparison of how good the automatic actuation was
14 compared to just the operator action?

15 MR. RAUGHLEY: No, we did not.

16 MR. KRESS: Okay.

17 MR. WALLIS: I guess the problem is you
18 want to get a number of 10^{-4} , you have to do what --

19 MR. ELTAWILA: I am not just defining the
20 10^{-4} , I'm just saying they are collecting information
21 on that --

22 MR. WALLIS: You can't collect
23 information, but if you try to get those --

24 CHAIRMAN APOSTOLAKIS: It's really
25 circumstantial evidence. It's important evidence, but

1 you can't really treat it like a statistical evidence.

2 MR. KRESS: That's why there's large
3 uncertainty associated with --

4 CHAIRMAN APOSTOLAKIS: When you do it
5 right, there is uncertainty. You have to do it in a
6 Category 1.

7 VICE CHAIRMAN BONACA: A question we had
8 was why do you have -- why does the standby liquid
9 system in some cases be automatic and some cases it is
10 not. Is it an option?

11 MR. RAUGHLEY: Yes, it was for the BWR 5
12 and 6s. It was required. It was based on a date of
13 licensure for all plants licensed after a certain
14 date.

15 VICE CHAIRMAN BONACA: So it met the
16 requirement of the -- resulting from the ATWS or was
17 it?

18 MR. RAUGHLEY: It was as a result of the
19 ATWS rule. BWR 5s and 6s were required to install an
20 automatic initiated high concentration.

21 VICE CHAIRMAN BONACA: But there was no
22 requirement to backfit the older plants?

23 MR. RAUGHLEY: No, on the value of impact
24 analysis, that didn't come out to be favorable.

25 VICE CHAIRMAN BONACA: The other question

1 I had was regarding the event trees used here in the
2 additional material. It shows -- maybe we can talk
3 about it later, simply that there is some event tree
4 where the standby liquid system is shown to fail with
5 the RPS. When the RPS fails, both the electrical,
6 then the mechanical one is not -- there is no window
7 there, there are not cut sets for that and there are
8 no cut sets for the standby liquid system. Is it
9 because the standby liquid system is tied to the same
10 electric instrumentation of the RPS?

11 MR. RAUGHLEY: No, it's not tied to the
12 RPS. The fault trees came from -- the origin of the
13 fault trees is they were -- if you let me get to it
14 further, if you look down in the presentation --

15 VICE CHAIRMAN BONACA: Please, whenever
16 you have an opportunity to address that. That's
17 Figure A2 that has that but we can talk about it
18 later.

19 MR. RAUGHLEY: So as I was saying, there
20 was considerable uncertainty on RPS. Human error was
21 another point of debate on the BWRs and on the
22 analytical side there was considerable discussion on
23 the codes that would be used. And on the sensitivity
24 of results, the certain operational design factors.

25 On the PWRs, the B&W and CE reactor pipes

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1 have different moderator temperature coefficients
2 throughout the cycle, smaller relief capacity, smaller
3 steam generators and different mechanical design
4 factors and then there's questions on whether you're
5 operating with the rods and auto or manual, whether
6 the PORVs are blocked or unblocked. So you get with
7 quite a maze of conditions to analyze.

8 In the 1980s, we had the Brown's Ferry
9 event and that was in Brentwood. Not all the rods
10 inserted due to a problem in the scram discharge
11 volume and that resulted in a confirmatory action
12 letter to install a reactor recirc pump trip.

13 Immediately following that, the NRC issued
14 a Draft ATWS Rule with three option, the Staff Rule,
15 the Henry Rule and the Utility Group Rule. The Staff
16 Rule was largely dependent on the deterministic
17 analysis, analyzing the pressures and temperatures
18 associated with an ATWS. The Henry Rule emphasized
19 improving RPS reliability, a specific program in that
20 area. And the Utility Group was a more practical
21 approach based on modifications focused on preventing
22 and mitigating an ATWS.

23 In 1983, we had the Salem events. There
24 were two events three days apart and that resulted in
25 several generic letters mandating improvement to the

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1 RPS trip system. Immediately following that, there
2 was a task force and steering committee organized by
3 the Commission and its primary deliverable was SECY-
4 83-293 which contains the technical basis and
5 regulatory analysis for the ATWS rule.

6 SECY 293 relied heavily on NUREG 460 for
7 the deterministic analysis and it adopted the Utility
8 Group approach for the risk assessment and it also
9 used the Utility Group value impact analysis.

10 The SECY-83-293 defined P(ATWS) which was
11 the annual frequency of an ATWS event, leading to
12 unacceptable plant conditions that exceed certain
13 design parameters which George referred to earlier in
14 the discussion. And for PWR, that unacceptable design
15 condition was the ASME Service Level C, pressure of
16 3200 pounds and for the BWR which was suppression of
17 full temperature of 200 degrees F. which was
18 established in 839.

19 On the BWR, just to quickly run through
20 the event, you start with an initiating event and you
21 have the RPS failure and it's assumed that there's no
22 credit for operator scrambling their reactor.
23 Increased pressure, if discharged through the SRV sort
24 of suppression pool and the severity of the heat up
25 depends on whether you close the MSIVs to isolate, in

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1 which case you would not have the condenser as a heat
2 sink or nonisolation transient where they don't close
3 and you have the condenser and the suppression pool
4 available for the heat sink.

5 The outcome is heavily dependent on
6 operator action. The operator is required to lower
7 the water level, to mitigate the event and for the
8 BWRs 1 through 4 standby liquid controls and for most
9 of the 5s and all the 6s start the standby liquid
10 control pump.

11 MR. KRESS: They lower the water level
12 about halfway into the core?

13 MR. RAUGHLEY: It is down to level -- I
14 don't know the specific -- which level, 7 or 8.

15 MR. LEITCH: It is well below the top of
16 active fuel though. It's down like a third of the way
17 down into the --

18 MR. WALLIS: It is a little touchy because
19 you've got to maintain cooling, but not maintain
20 reactivity.

21 MR. KRESS: That's the idea.

22 MR. RAUGHLEY: And for an isolation
23 transient, the operator has two minutes to make that
24 decision and for a nonisolation transient he has 17
25 minutes to make that decision. And the probabilities

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1 for those action are taken --

2 MR. WALLIS: Does he have good feedback so
3 he knows that his level is the appropriate level that
4 he's trying to get --

5 MR. RAUGHLEY: I don't know.

6 MR. WALLIS: That it's really working out
7 --

8 MR. RAUGHLEY: BWR instrumentation is not
9 -- doesn't have real good feedback.

10 MR. ROSENTHAL: Can I just chime in? What
11 we tried to do in assessing the rule was say what do
12 we know at the time of the rule and what do we know
13 now and what are the changes? Separate from that
14 activity we now know that if you trip the recirc pumps
15 you will fall into a region of potential instability
16 where you get isolations.

17 And that introduces a whole new set of
18 technical concerns including what would the instrument
19 displayed to the operator, because the instrument is
20 not connected to the inside of the core and has its
21 own delay times, etcetera. And we're looking at those
22 BWR isolation issues as part of Research's work, but
23 we're trying not to introduce that into the assessment
24 of what was known at the time of the rule and what did
25 we get? So we do have future work planned on those

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1 issues.

2 MR. LANIK: Yeah, and also I think for our
3 particular case here, we did not give a lot of
4 operator credit in our particular analysis, we didn't
5 give anywhere near as much as you noted for River
6 Bend.

7 MR. RAUGHLEY: Okay, on the PWR, you have
8 an initiating event RPS failure also, no credit for
9 operator action to scram the reactor. You increase
10 the RCS pressure, then the pressure is relieved. You
11 start HPI and aux. feed. And that's also dependent on
12 whether the turbine trips or the turbine doesn't trip,
13 whether you have the condenser available for a heat
14 sink or not.

15 The peak pressure on the PWRs is dependent
16 on the moderator temperature coefficient which is a
17 measure of the reactivity as a function of
18 temperature. And in general, sufficiently negative
19 and works with a Doppler to give you a negative
20 feedback coefficient. However, there are points in
21 the fuel cycle at the beginning of the fuel cycle.
22 You have a positive, PMTC sufficiently negative or
23 slightly positive and that can give you a positive
24 feedback characteristic. And the amount of time that
25 it's insufficiently negative or positive is called the

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1 unfavorable exposure time.

2 The ATWS risk analyses were done assuming
3 that the MTC was acceptable 99 percent of the time and
4 that the deterministic analysis supplied by the
5 manufacturers were done assuming the MTC was
6 sufficiently negative 95 percent of the time.

7 MR. SIEBER: Why did they allow the
8 moderator temperature coefficient to be positive at
9 any time? You can absolutely design that out of the
10 fuel by putting in burnable poisons.

11 MR. RAUGHLEY: It is a function of the
12 fuel cycle length.

13 MR. SIEBER: You put in burnable poisons,
14 it's a matter of how many hours worth of neutrons
15 you're willing to spend to maintain the negative
16 moderator temperature coefficient.

17 MR. RAUGHLEY: Yes, and you would also,
18 it's a function of what you said, the boron
19 concentration --

20 MR. SIEBER: The less, the better off you
21 are.

22 MR. RAUGHLEY: But dependent on how you
23 vary all those factors and controls, the --

24 MR. SIEBER: You can design that out.

25 MR. RAUGHLEY: Yes.

1 MR. SIEBER: And so it would seem to me to
2 minimize the exposure you'd have licensees design it
3 out, design out a positive temperature coefficient.

4 VICE CHAIRMAN BONACA: I don't think you
5 an totally eliminate that effect because of what you
6 have. You have at the beginning of the transient you
7 have number pressure transient, enough scram. You
8 have a temperature increase. I think you're going in
9 a region where you have some positive feedback.

10 I'm not sure you can leave it at that
11 completely. That has been difficulty there.

12 MR. SIEBER: I was under the impression --
13 we managed to do that and I was under the impression
14 it can be done, given sufficient burnable poison,
15 coated pellets, inserts and so forth.

16 MR. LEITCH: One of the things that I
17 found interesting in that respect and we're concerned
18 about the combined effects of power upgrades and
19 license renewals and extended fuel cycles and so forth
20 is a sentence here on page 17 of the report that I
21 felt was interesting in that regard.

22 It says fuel designed to achieve longer
23 cycles result in less negative MTCs at full power, but
24 a larger fraction of the cycle time during which time
25 half this mitigation is rendered ineffective. And I

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1 just think that's one of these effects of longer cycle
2 time that might not be apparent. That's one of the
3 things that we've been kind of worried about.

4 MR. KRESS: It's one we ought to put on
5 our list, maybe.

6 MR. LEITCH: Yeah, right. Just a comment.

7 MR. RAUGHLEY: That is one of the
8 conclusions the report is -- that we should continue
9 to give that attention because as a result of
10 deregulation and the emphasis to be more competitive,
11 the BWRs would likely go to longer cycle times, 18-
12 month and 24-month cycles which requires you to
13 further increase the MTC.

14 But this is from NUREG-1000. It's based
15 on Salem-specific factors that has an MTC of -8 which
16 is their normal value at hot, full power, all rods out
17 and the 95 percent -- at 95 percent of the fuel cycle.
18 What you can see is the pressure does go up to 3500
19 pounds in about 100 seconds and one of the debating
20 points in NUREG-460 is whether the manufacturer was
21 looking at 100 and the NRC's analysis was looking at
22 60, but the point being is very short, it ramps up
23 real quick in a very short time.

24 MR. LANIK: Basically, that's timed with
25 usually steam generator dry out time, as soon as the

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1 steam generator dries out, the pressure shoots up.

2 MR. KRESS: What was used to calculate
3 that? RAMONA and RELAP together?

4 MR. RAUGHLEY: Westinghouse uses four
5 programs. They use LOFTRAN, maybe Farouk -- there's
6 four different codes, so depending on where you are on
7 this curve --

8 MR. KRESS: I should have known that.

9 MR. RAUGHLEY: They use LOFTRAN down in
10 this area and they switch off.

11 Then last but not least, the ATWS rule was
12 passed in 1984 which requires specific modifications
13 by reactor type that we'll discuss in detail on the
14 next slide.

15 And as George mentioned earlier, when
16 you're looking at a rule, not everything about the
17 rule is written in the Code of Federal Regulations or
18 some important background, one being that along with
19 the FRN that issued the rule, there were two
20 recommendations made by the Commission. One was that
21 they expected that the licensees would undertake an
22 RPS reliability improvement program and the other was
23 that they would reduce the number of automatic scrams.

24 We'll breeze through this slide quick,
25 since you saw it before in the station blackout

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1 presentation.

2 (Slide change.)

3 MR. RAUGHLEY: But the --

4 MR. WALLIS: Well, the regulation is
5 effective if expectations are being achieved.
6 Sometimes the statements of consideration don't give
7 a very clear exposition of just what is expected.

8 MR. RAUGHLEY: That's true and in this
9 case that's true and we have to go back to SECY. Most
10 of the meat and potatoes for the ATWS rules in SECY-
11 83-293 which the statement of considerations refer to.
12 And then the statement of considerations also refer
13 you, that if you're interested in the deterministic
14 analysis, they're in the appendices of NUREG 460, but
15 it provides you with a roadmap on which documents to
16 go back and review.

17 The basic approach we took to effect this,
18 as the regulations effect, the expectations are being
19 achieved and we got those expectations from the NRC
20 documents, as I mentioned, largely SECY-82-293 and the
21 outcomes, we used operating experience, the NRC PRA
22 IPE data bases which is available on the webpage LERS,
23 NRC surveys of the moderator temperature coefficient
24 that was done in 1995 and NRC RPS reliability studies.

25 The scope of the rule was to stay within

1 the confines to compare what, exactly what they did to
2 the outcome. We didn't try to read anything into the
3 rule, change the method. We used their methods, tried
4 to do the calculations the same way they did, so we
5 had an apple to apple comparison.

6 Certainly, some things could be done
7 better, more precise and with technology today, but
8 then you wouldn't know if you made any progress as far
9 as what the authors expected in 1984.

10 The ATWS rule required certain
11 modifications by reactor type. For the PWRs, were all
12 required to install AMSAC which is the ATWS mitigation
13 system actuation circuitry which -- that's what I'm
14 referring to in the first line there and that's a
15 diverse means to trip the turbine and auxiliary
16 feedwater and what that does is -- AMSAC monitors
17 steam generator levels and initiates when the level
18 drops below a certain set point.

19 The CE and B&W PWRs installed a diverse
20 scram system referred to as a DDW and this Scams the
21 reactors on high RCS pressure, about 2450 is what most
22 of them are set at and that signal is derived from the
23 raffle system.

24 The CE and BWR reactor types have an
25 insufficient MTC, approximately 40 percent of the fuel

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1 cycle. It seems like a longer exposure. That was the
2 primary driving force for installing the diverse scram
3 system, but you can -- this is for the -- I want to
4 say CE reactor. They're showing for 18-month and 24-
5 month fuel cycle, the percentage of time that they
6 would be above the 3200 pounds.

7 MR. WALLIS: Is it worse at the beginning?

8 MR. RAUGHLEY: Always. Typically, the
9 moderator temperatures --

10 MR. WALLIS: Counter intuitive. You
11 usually expect new things to be better.

12 MR. POWERS: Not true in fuel reactivity.
13 You burn the fuel up, see?

14 (Laughter.)

15 MR. RAUGHLEY: All PWRs have MTC tech spec
16 limits at hot zero power and how full power. And
17 we'll summarize those a little further down in the
18 discussion.

19 For the BWRs installed, an alternate rod
20 injection system, which is typically DC scram valves
21 on the exhaust discharge volume. And BWRs have, as we
22 discussed before, high capacity, high concentration
23 standby of the control systems. The systems were
24 typically about 40 GPM and the rule requires them to
25 increase them to 86 GPM and most BWR 5 and 6 is

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1 installed automatic standby liquid control.

2 The ATWS rule also required installation
3 of recirc pump trip which also is redundant to the
4 confirmatory action letter that was issued after the
5 Brown's Ferry event.

6 As far as another -- all of the
7 modifications were installed in the 1986 to 1990 time
8 frame. As far as the Commission recommendations, the
9 frequency -- the number of automatic scrams was
10 reduced. It was 6 in 1980 and the industry started on
11 a program in the early 1980s to reduce it and it was
12 4 in 1984 at the time the ATWS rule was passed and
13 that was what was used as an input to the ATWS
14 analysis.

15 And in 1997, 1998 and 1999, in each of
16 those years it was .5 trips were year and within that
17 it should be noted in each of those years the 60 to 70
18 percent of the operating reactors had zero scrams and
19 in any one year 10 to 20 percent had 2 to 4 scrams.
20 So they're the two ends.

21 CHAIRMAN APOSTOLAKIS: But is this
22 reduction frequency the result of the rule?

23 MR. KRESS: That was sort of a secondary
24 thing the Commission asked for.

25 MR. RAUGHLEY: It is second, but what did

1 come as a result of the rule was four days before the
2 ATWS rule was passed, the industry briefed the
3 Commission on the fact that they were going to make
4 scram reduction a program, that this would become a PI
5 in 1985, 1986. I think it was a catalyst to
6 formalizing a program and getting it, giving it
7 visibility rather than something that was being done,
8 that we were to assume being done.

9 CHAIRMAN APOSTOLAKIS: Is it fair to claim
10 that this was the effectiveness of the rule?

11 MR. KRESS: It was a response to the rule
12 being promulgated.

13 VICE CHAIRMAN BONACA: This study provided
14 really a lot of sensitivity in the industry in
15 regarding the acquisition and that's part of the drive
16 of the concern with the failure of the RPS was coming
17 from.

18 CHAIRMAN APOSTOLAKIS: What were the main
19 reasons that we had this order of magnitude reduction?

20 What did they do?

21 MR. RAUGHLEY: More attention to analyzing
22 the scrams that they had.

23 MR. ROSENTHAL: The dominant contributors
24 to react a trip was number one to the turbine systems
25 and number two to the feedwater systems. And we've

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1 gone through a whole generation of improvement.
2 There's now a lot of digital feedwater control systems
3 that help you go up. There's a trip reduction
4 program. You walk around a plant and there's taped
5 off areas, telling people not to trip over stuff.

6 There was a time when you had technicians
7 -- you'd put a probe inside a cabinet and there's some
8 likelihood you're going to slip, well, there's a lot
9 of banana jacks around so that you connect up your
10 scope right without slipping. So there were real
11 hardware things associated with the turbine and the
12 feedwater which have commercial implications as well
13 as safety implications. And then just plain better
14 maintenance.

15 VICE CHAIRMAN BONACA: Better training,
16 heavily dependent on training because the sensitivity,
17 for example, testing was an issue.

18 MR. KRESS: We heard about a reactor in
19 Switzerland yesterday that's gone 10 years without an
20 automatic scram.

21 MR. LEITCH: One of the things that
22 perhaps is lost up there is where it says upgrade
23 EOPs. I think that was a very significant step in
24 scram reduction, coupled with well thought out
25 emergency operating procedures, coupled with operator

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1 training, along in this time is the advent of plant
2 specific simulators which I think helped a great deal
3 in the scram reduction.

4 But I wonder, like George, if you just
5 upgraded the EOPs and improved operator training and
6 reduced automatic scram frequency, reduced RPS --
7 increased RPS reliability, wouldn't that have greatly
8 improved the situation? In other words, I guess what
9 I'm wondering is I guess it's not really possible to
10 separate out how effective the hardware modifications
11 were in making these improvements.

12 MR. RAUGHLEY: Two slides down we do.

13 MR. LEITCH: Very good, thanks.

14 MR. RAUGHLEY: I think we're getting to
15 the same place you are. And then the other
16 recommendation as far as RPS reliability -- could you
17 put up that slide?

18 (Slide change.)

19 MR. RAUGHLEY: Put a table in the report,
20 basically shows the first line is what
21 SECY-83-293 expected and that was calculated based on
22 one failure from Brown's Ferry and Westinghouse for
23 each of the reactor types to get the value here. This
24 is the improvement expected as a result of RPS
25 reliability --

1 CHAIRMAN APOSTOLAKIS: Let me understand
2 this. Was the Brown's Ferry incident really a
3 failure?

4 MR. LEITCH: Not a total, partial failure.

5 CHAIRMAN APOSTOLAKIS: It was partial
6 failure.

7 MR. RAUGHLEY: There were --

8 CHAIRMAN APOSTOLAKIS: They were buying
9 themselves time and they were going to drain the water
10 from the scram discharge volume.

11 MR. LEITCH: Some of the rods inserted all
12 the way, others failed to insert.

13 CHAIRMAN APOSTOLAKIS: Right, over a
14 period of time they managed to actually scram. This
15 is really conservative, is it not, to say that there
16 was one failure? This has been the perennial problem
17 with scram reliability. There were raging debates.

18 MR. RAUGHLEY: It was to find more than,
19 I think it was a third of the rods did not go in, that
20 would be considered a failure.

21 CHAIRMAN APOSTOLAKIS: It was not that
22 they didn't go in period. I mean this was a dynamic
23 event. The operators intervened and so on and that's
24 not here. So 10^{-5} doesn't really mean much.

25 MR. LEITCH: Did the rods go in to make

1 the reactor subcritical? I think they did.

2 CHAIRMAN APOSTOLAKIS: Pardon me?

3 MR. LANIK: No, they were at about 20
4 percent power.

5 MR. LEITCH: Were they?

6 MR. LANIK: Yeah.

7 MR. LEITCH: I'd forgotten the details.

8 MR. RAUGHLEY: As I mentioned earlier the
9 pivotal to the ATWS is the RPS reliability, does make
10 a difference in the numerical answer, whether you use
11 10^{-4} , 10^{-6} and the discussion you're starting is
12 exactly the discussion in the 1970s over whether you
13 count this as a failure or not and what number do you
14 use.

15 CHAIRMAN APOSTOLAKIS: I mean this
16 probably should have been analyzed as a precursor
17 event, following the sequence and seeing what kind of
18 probability you get rather than a straight forward
19 classical statistics analysis because it was not a
20 failure.

21 I mean that's clearly an upper bound, if
22 you assume it's a failure, the number you have there?

23 MR. RAUGHLEY: They calculate upper and
24 lower bounds about these values.

25 CHAIRMAN APOSTOLAKIS: How do they get the

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1 lower bound?

2 MR. RAUGHLEY: They use a binomial
3 distribution.

4 CHAIRMAN APOSTOLAKIS: Oh God, oh.

5 MR. RAUGHLEY: Again, I didn't challenge
6 what the people did.

7 CHAIRMAN APOSTOLAKIS: Is this being
8 recorded? Oh. Let's go off.

9 MR. RAUGHLEY: That was 1984, George,
10 before you came along.

11 CHAIRMAN APOSTOLAKIS: I was an Assistant
12 Professor.

13 MR. POWERS: I get the vague sense that
14 maybe you're a little disappointed?

15 CHAIRMAN APOSTOLAKIS: You always read me
16 right.

17 MR. RAUGHLEY: This is the expected
18 improvement. This is the result, if you treat the
19 calculation the same as they did in the ATWS rule.
20 You can see they didn't get the improvement achieved,
21 the improvement you wanted. And then this is using
22 the latest methodology in NUREG-5500 which starts with
23 data from 1984 to the present.

24 And this is the value you get. But
25 there's not much --

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1 CHAIRMAN APOSTOLAKIS: It that done like
2 a precursor analysis in the 5500 or again is it the
3 straight forward statistics?

4 MR. RAUGHLEY: 5500 is they modeled the
5 different components. They broke the RPS system down
6 into 30 or 40 different components and got the failure
7 data on those components and modeled it as a system.

8 CHAIRMAN APOSTOLAKIS: The important
9 lesson from the Brown's Ferry incident is the
10 operators do have time to intervene. It's not a yes,
11 no event.

12 MR. RAUGHLEY: I think I mentioned at the
13 beginning you have to 2 to 17 minutes depending on --
14 that's the consideration they gave to it.

15 CHAIRMAN APOSTOLAKIS: Okay.

16 MR. KRESS: Before you take that off, if
17 we believe the bottom line why then we can say the
18 expectation was met. If we believe the next to the
19 bottom line, we say a dozen.

20 Since I'm a Bayesian of sorts, I like the
21 bottom line. I presume that's one we ought to
22 believe?

23 MR. RAUGHLEY: If you throw out the
24 failure data, you get a good answer.

25 CHAIRMAN APOSTOLAKIS: That is usually the

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1 case.

2 (Laughter.)

3 But remember though there is also a
4 question about the denominator, what is the demand?

5 MR. RAUGHLEY: Yes.

6 CHAIRMAN APOSTOLAKIS: It is a big
7 question. Right? So the number of demands they use
8 there, one probably --

9 MR. RAUGHLEY: The denominator is probably
10 a good estimate. We do understand how many time a
11 month they test a reactor. What's in question is the
12 numerator, because not all reactor
13 -- not all of these failures are reported.

14 CHAIRMAN APOSTOLAKIS: But even the
15 denominator, wasn't there an argument made that
16 they're moving all the time. You don't scram, but
17 that's an indication of how things work and that's a
18 very difficult piece of evidence. It's not that the
19 rods are there and either they go in or not.

20 That was a big argument in the 1970s. I
21 mean how much credit do you take for that and the NRC
22 finally said no, we'll count real scrams.

23 I notice a reluctance to show event trees.
24 The report has report trees, but your presentation
25 does not. Is there any reason why you don't have --

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1 MR. RAUGHLEY: We have event trees.

2 CHAIRMAN APOSTOLAKIS: I know you have
3 event trees. I'm just asking why you don't show it.

4 Anyway, okay, please go ahead.

5 MR. RAUGHLEY: This slide next.

6 (Slide change.)

7 MR. RAUGHLEY: As far as P(ATWS) in
8 getting to what Mr. Leitch, I think, was headed, most
9 -- as you can see, as far as P(ATWS) goes, it did meet
10 the goal of 1.0E-5 in all cases, but the majority of
11 the improvement came from the initiating event
12 reduction and not from the modifications.

13 CHAIRMAN APOSTOLAKIS: That is an
14 interesting --

15 MR. KRESS: That's an interesting --

16 CHAIRMAN APOSTOLAKIS: Why is that?

17 MR. KRESS: It's a direct multiplier. The
18 other one, you have to --

19 CHAIRMAN APOSTOLAKIS: I mean if you
20 install hardware, if you make hardware modifications,
21 shouldn't you see some --

22 MR. KRESS: It's the number of scrams.
23 You don't challenge the hardware.

24 CHAIRMAN APOSTOLAKIS: All PWS install
25 diverse means to trip the turbine or that affected

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1 what, the initiating event frequency?

2 MR. LANIK: Basically what that does is
3 affect the operator action time. It lengthens the
4 time you have water in the steam generator. You're
5 talking about tens of seconds.

6 MR. KRESS: Let me ask you a question
7 about this table. We have a set of ATWS sequences in
8 the event trees. What was their contribution to the
9 overall risk, say CDF, if we use a P as the CDF
10 surrogate to the point for those classes of plants?

11 MR. LANIK: We did not summarize those in
12 aggregate. They're listed individually in the
13 appendices for each plant of their contribution. What
14 they estimate is their contribution on a
15 plant-specific basis. We didn't go back and add those
16 up.

17 MR. KRESS: But it was generally a high
18 times 10^{1-5} approaching 10^{-4} . Is that -- I'm trying to
19 figure out why the ATWS events were considered an
20 unacceptable risk in the first place and of course
21 that depends --

22 MR. RAUGHLEY: It's a low probability,
23 very high consequence. It's an unforgiving event,
24 with the high pressure and the PWRs.

25 MR. KRESS: And high uncertainty also?

1 MR. RAUGHLEY: Yes.

2 MR. KRESS: But I was trying to put some
3 numbers on it. How much contribution does that set of
4 sequences give to the overall CDF of giving class a
5 plant, say it was the number I'm looking for?

6 MR. LANIK: I am just looking in our
7 appendix and I see look at Tewkesbury and they claim
8 24 percent as the contribution of ATWS.

9 On others, you can just look through the
10 list, I guess.

11 MR. LEITCH: But if you go to the extreme,
12 you've got .000645.

13 The difference is what one assumes about
14 operator action.

15 MR. KRESS: But I'm wondering why that was
16 considered unacceptable so we had to have a rule in
17 the first place. That's the point I'm getting to.

18 MR. LANIK: I think it's the point that
19 Jack made earlier. It was the uncertainties --

20 MR. KRESS: Large uncertainties.

21 MR. LANIK: Large uncertainty in these
22 things and the fact that some people were claiming 10-
23 8 and I think that's a number that nobody would
24 believe.

25 MR. KRESS: Frankly, I think that's a good

1 answer, that there was large uncertainty -- that it
2 was a sizable contribution and it was high uncertainty
3 in that number.

4 MR. ROSENTHAL: And as a matter of fact,
5 we've spoken a number of times and in fact, we got an
6 opportunity to interview Mr. ATWS at the NRC which is
7 our office director. And as much as anything else, at
8 least in my mind the purpose of this rule was not to
9 suppress the risk of the plants so much as to suppress
10 the uncertainty in the risk of the plants. And we had
11 gone back and forth for 15 years with the industry and
12 then came up with what seems like a pragmatic approach
13 to drive down the uncertainty.

14 But let me just go on with the risk a
15 little bit more. If you take the Limerick Plant which
16 I just happen to know, ATWS is 1 percent of the core
17 damage frequency, so that's a small contributor.
18 However, because in ATWS you fail the containment
19 before you melt the core, it was the dominant
20 contributor to large early release.

21 Now those are insides that at least I have
22 post the ATWS rule, but that was still as important on
23 boilers, especially because of the fact that you
24 failed the containment before you failed the core.

25 MR. KRESS: Frankly, I'm very pleased to

1 hear you say that one good purpose of rules is to
2 reduce uncertainty. I'm really glad to hear that.

3 MR. RAUGHLEY: I think the other thing
4 they were wrestling with then is you had the very low
5 numbers, but you also had three events. If it's
6 really 10^{-6} or 10^{-8} well why do we have three events?

7 MR. KRESS: Why do we have three events,
8 that's right. Bayesian thinking again.

9 MR. RAUGHLEY: We'll go to the comments.

10 (Slide change.)

11 MR. RAUGHLEY: We sent this out, as I
12 mentioned in the beginning of the discussion for
13 public comment and we've received internal comments
14 from NRR from Rich Barrett's group, the BRA Assessment
15 Branch and the Reactor Systems Branch and we've
16 received external comments from the people I've listed
17 there.

18 Some of the highlights of the comments,
19 UCS and Westinghouse commented that the risk approach
20 was very simplistic and that's a --

21 MR. KRESS: We've made the comment before
22 that the complexity and extent of the risk ought to
23 depend on the application and how much of a risk
24 analysis do you need for retroactive look at something
25 like this? I don't know how simplicity -- simplicity

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1 doesn't seem to be too bad to me in this case.

2 MR. RAUGHLEY: And then alluding to a
3 question -- well, by the --

4 CHAIRMAN APOSTOLAKIS: The analysis of
5 Brown's Ferry, for example, could have been done
6 better.

7 MR. KRESS: I don't think that's the
8 analysis I'm talking about.

9 CHAIRMAN APOSTOLAKIS: That's not the
10 issue here.

11 MR. RAUGHLEY: In the final value impact
12 analysis, I did not -- the original value impact
13 analysis, the costs were divided up into the
14 modifications and then the costs for lost power due to
15 spurious scrams due to the installation of systems
16 such as AMSAC and I went back and identified the
17 number of spurious scrams which were considerably less
18 than expected which helped make it more favorable.
19 And then I also stuck, there's a couple of sentences
20 in there about I gave the NRC some credit for the
21 scram reduction program because there are significant
22 bucks. It's in excess of \$10 billion if you credit --
23 somebody gets credit for that and a lot of people
24 suggested, as George maybe was, that the NRC had
25 nothing to do with it.

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1 MR. LEITCH: Did you consider the downside
2 of false automatic boron injections?

3 MR. RAUGHLEY: There weren't any, but that
4 was --

5 MR. LEITCH: I know there was one at
6 Limerick.

7 MR. RAUGHLEY: On the original actual just
8 Tewkesbury's actuation of the systems that were being
9 installed under the ATWS rule as calling a scram,
10 diverse AMSAC which there have been several spurious
11 actuations of, I think, 13. But that's a lot lower
12 than the one or two per plant that was expected per
13 year. And the --

14 MR. LEITCH: But you're talking about
15 false scrams.

16 MR. RAUGHLEY: Yes.

17 MR. LEITCH: I'm speaking about false
18 boron injections.

19 MR. RAUGHLEY: I don't think they
20 considered that in the original rule.

21 MR. LEITCH: But in the economic benefit
22 of this, did you debit that?

23 MR. RAUGHLEY: No, because they didn't do
24 it in the original rule. I did whatever they did in
25 the original rule.

1 MR. LEITCH: I see.

2 MR. RAUGHLEY: Just so you could measure
3 the expectation versus the outcome.

4 MR. LEITCH: Because there have been, I
5 think, a few of those and then that increases the
6 outage time because you have to clean up and several
7 days sitting there cleaning up. Okay.

8 MR. RAUGHLEY: The other discussions on
9 the PWR comments, one is to recognize that there were
10 sensitivities to different design features between the
11 Westinghouse and in contrast to the CE and B&W plants
12 and we have a few sentences in there on that, we'll
13 beef that up in the final report.

14 And then there were opposing comments from
15 the industry, de-emphasized the MTC/UET issue and the
16 NRR wanted us to increase our emphasis in that area.

17 We have a lot of "mays" and "could be's"
18 and NRR would like us to make those hard statements.

19 UCS had a comment tying the steam
20 generator tube issues to the MTC issue and then in all
21 cases, both the BWR and the PWR manufacturers would
22 like us to give more credit for operator action in the
23 scram. We've acknowledged that in the report based on
24 the NUREG-5500, if you credit the operator or scram
25 you halve the factor of 2 on the risk. So we'll roll

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1 that up into an observation or conclusion of the
2 report.

3 And then what we plan to do is each
4 comment will be addressed in an appendix of the report
5 like we did in the station blackouts so you'll see the
6 comment as submitted, and then we'll provide a
7 response to it. And those will be issued with the
8 final report.

9 The conclusion, we concluded primarily
10 based on the risk that the ATWS rule was effective,
11 the modifications were installed as intended and it
12 was effective in reducing the risk. The target was
13 $1E^{-5}$ for P(ATWS) and as you saw they were in the order
14 of 10^{-6} . However, there's still uncertainties in the
15 RPS reliability. You still have to -- if you give
16 benefit to the full range of the statistics, you can
17 still get some answers that are -- maybe you wouldn't
18 like.

19 And you still have questions about the
20 data because RPS failures aren't always reported. And
21 then in the area of the mitigative capability, we have
22 the concerns about the fuel management issues as we
23 discussed earlier with the utilities need to become
24 more competitive and a way to do that is to extend the
25 fuel cycle. To do that, you've got to increase the

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1 MTC and that's as Westinghouse has submitted.

2 VICE CHAIRMAN BONACA: And for BWR isn't
3 it true that given the chance there's some dependency
4 on operator action?

5 MR. RAUGHLEY: And that was our third
6 problem that we thought we needed attention and as far
7 as getting back to Mr. Wallis as to what to do, we
8 didn't come up with a solution.

9 VICE CHAIRMAN BONACA: No, the question I
10 had was I thought that I remember a power operates
11 coming in for BWRs and those are likely to accelerate
12 sequences including the ATWS sequence. Wouldn't that
13 challenge further the operator action that -- or
14 defectiveness of it?

15 MR. ROSENTHAL: Yes, we are planning a
16 separate research initiative on what we call the
17 synergistic effects of the power upgrades, the longer
18 cycles, the change in fuel designs and we'll be coming
19 up with a plan and likely write a Commission paper
20 before we embark to try to figure out some way to put
21 these together in a synergetic effect, rather than
22 looking at the issues one by one.

23 That's a separate activity.

24 MR. LEITCH: Just a comment on Table 1B,
25 the column that's headed modification summary, is

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1 there any reason why you didn't annotate that to
2 indicate which plants had automatic boron injection,
3 automatic standby liquid injection?

4 MR. RAUGHLEY: I thought we did for a few
5 of them.

6 MR. LEITCH: Table B2, there's a table
7 called modification summary and I don't see any
8 indication there which plants have automatic SLC
9 injection.

10 MR. RAUGHLEY: We can add that.

11 MR. LEITCH: Just out of curiosity.

12 MR. RAUGHLEY: We can add that.

13 VICE CHAIRMAN BONACA: Before I raise the
14 question regarding the Figure A2, Figure A2 shows in
15 the event tree you have the branch where you assume
16 the electrical RPS failure. And that doesn't have any
17 -- of course in a failure you do have also a
18 consequential and mechanical RPS failure. You have no
19 -- not that one. A2.

20 MR. LANIK: We do not have that first
21 slide.

22 VICE CHAIRMAN BONACA: It has a branch
23 that essentially shows failure of the electrical RPS
24 and then a straight line, I don't know for the
25 arranged your CAT sets to assume successful failure of

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1 the other components downstream. Why is it? I can
2 understand if you have a failure of the RPS electrical
3 you have also failure of the mechanical, but what
4 about the automatic standby liquid system?

5 MR. LANIK: Well, this is basically the
6 event tree that was in the NUREG and we didn't change
7 these. And as a matter of fact, we didn't really use
8 this in any of the calculations we did. So I would
9 say we didn't look at this one very closely. The
10 other ones we actually have the tables with the
11 numbers that we plugged in and we looked at those
12 closely. This one -- we took it from the original
13 ATWS rule, NUREG and put the numbers in that we got
14 from the people in the reliability area.

15 I don't know the reason why that was left
16 out. I think it doesn't matter much because the
17 electrical is so reliable, really, I mean in other
18 words you always -- you usually go that way.

19 You're not going to have many
20 contributions there.

21 MR. WALLIS: These are all amalgamous LCs.
22 Maybe that makes a difference.

23 VICE CHAIRMAN BONACA: That's right, but
24 then at that point you would have a gate and you will
25 have success or failure system still.

1 MR. LANIK: It's almost never -- you know,
2 it's a very small number. That's not going to be much
3 of a problem.

4 MR. SIEBER: A minor question. It seems
5 to me from my memory, AMSAC was a non-safety grade
6 system?

7 MR. RAUGHLEY: Yes.

8 MR. SIEBER: On page 10 you discuss in the
9 report reliability of ATWS mitigating systems. Did
10 the fact that AMSAC is non-safety grade have any
11 impact on the estimate of reliability that's discussed
12 there and in the previous table, top of the page?

13 MR. RAUGHLEY: No. The reliability we
14 have is from the operating experience. So whether
15 they got it --

16 MR. SIEBER: One way or the other?

17 MR. RAUGHLEY: One way or the other. It--

18 MR. SIEBER: Well, somebody some place
19 must have made a judgment that you don't have to have
20 AMSAC of safety grade.

21 MR. RAUGHLEY: All the ATWS modifications
22 are non-safety.

23 MR. SIEBER: Right.

24 MR. RAUGHLEY: Right.

25 MR. SIEBER: And that's because they don't

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1 have a lot of impact on the risk that scram reductions
2 had a far greater impact?

3 MR. RAUGHLEY: Yeah, that's the bottom
4 line. The biggest impact was the scram --

5 MR. ROSENTHAL: Let me just point out, I
6 mean this was anticipated transient, normal transient
7 without scram.

8 MR. SIEBER: Right.

9 MR. ROSENTHAL: It wasn't a
10 seismic-initiated event or a Hughes situation, so the
11 special conditions didn't apply. I think this was a
12 very reasonable thing to do to make them, a system
13 without all the pedigree, but it was always expected
14 that they would be -- and of course, they are, high
15 grade commercial.

16 But it does point out the importance of
17 getting voluntary data collection on the component
18 level with -- through INPO because if it's not
19 reported via an LER because it's not safety-related,
20 you need some other way of collecting the data and so
21 these other ways are important to us.

22 MR. SIEBER: Thank you.

23 VICE CHAIRMAN BONACA: The question I had
24 was why was 3200 psi used as a criterion for lack of
25 effectiveness? I mean you mentioned it above 3200 you

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1 may have failures of some valves and so on and so
2 forth. But the RCS is designed to withstand much
3 higher pressures than that, I can see --

4 MR. RAUGHLEY: They considered ASME
5 service level D.

6 VICE CHAIRMAN BONACA: D, okay.

7 MR. RAUGHLEY: I think that got above --
8 I think the steam generator for 3600 psi is what
9 Westinghouse told us the limit was there. But I think
10 the D gets above that and then the D also gets into an
11 area where they really don't know if the valves are
12 going to deform or not where there's a lot of testing
13 really hasn't been done in that neighborhood.

14 MR. SIEBER: Actually, at that level you
15 get some component deformation, for example, tube
16 sheet bowing and so forth which is maybe not a
17 disaster as far as integrity and continued service,
18 but it's there, nonetheless.

19 MR. RAUGHLEY: Any other questions?

20 MR. POWERS: I guess I've got two or
21 three. One of the first questions is an element of
22 phenomenology. Does the appearance of an axial offset
23 anomaly affect significantly the response of the plant
24 to an ATWS condition?

25 MR. LANIK: I don't know. Do you know,

1 Jack?

2 I would say that probably that hasn't been
3 analyzed.

4 MR. ROSENTHAL: Years ago when I had hair,
5 I ran a 3D space-time kinetics calculations and those
6 were different than a 1D and clearly different from
7 point kinetics. So the axial offset would change,
8 would change the response in the calculational model.

9 Now I was recently sobered by Norm Laubin
10 who is sitting to my left because we just tried to do
11 some sensitivity studies with just relap with a simple
12 point model, but kinetics model and as -- just to get
13 some feel for this and as Norm did the calculations
14 and you know, you just turn the little knob on the MTC
15 or you turn the little dial on the relief capacity in
16 the primary system, you go from being, having steam in
17 the pressurizer to going solid, you do one thing, you
18 end up with 3100. You turn the knob a little bit
19 differently, you get 4,000 pounds and big differences.

20 And so that was sobering that the
21 calculational model, the thermohydraulic model had a
22 lot of questions for them and so I would get back to
23 the forte of the rule was it suppressed the concern in
24 these things.

25 MR. POWERS: I guess what I'm wondering is

1 if we aren't seeing a reimposition of uncertainty as
2 these phenomena associated with longer duty cycles
3 come up and we get these axial offsets.

4 MR. ROSENTHAL: And that's why research is
5 interested in doing a study of the synergistic effects
6 of all these changes, absolutely.

7 MR. SEALE: I think it's important to
8 remember that the effect of point kinetics is always
9 to inject a coherence of events into any calculation
10 and you will always over emphasize the simultaneity of
11 a pressure pulse or a radiation pulse or anything else
12 using point kinetics and if --

13 MR. POWERS: I don't think that's the
14 question here. The question is are they doing any
15 calculations on the neutronics at all here in response
16 to the axial offset anomaly?

17 MR. SEALE: I was going to say if there
18 was ever a justification for going into those issues
19 of computational capability, there it is.

20 MR. POWERS: I derive from your study that
21 a substantial amount of the evolution in ATWS
22 probability arose from the reduction in the scram
23 frequency that seemed to be correct.

24 MR. RAUGHLEY: Yes.

25 MR. POWERS: And I believe that we now

1 have a reactor oversight system in which scram
2 frequency, unplanned scram frequency is a performance
3 indicator?

4 MR. RAUGHLEY: Yes.

5 MR. POWERS: If a plant were to go from
6 the green to the white in its unplanned scram
7 frequency and for the purposes of the thought let's
8 say that they're all automatic scrams and none of them
9 were manual, how would the frequency of ATWS events
10 change?

11 MR. RAUGHLEY: If it were to --

12 MR. POWERS: If the frequency at a plant
13 for unplanned scrams -- I predicate it by saying
14 they're all automatic, were to go from green to white,
15 how does the frequency of ATWS events change?

16 MR. LANIK: I believe it's about an order
17 of magnitude.

18 MR. POWERS: Which would put it over the
19 Commission's goal or near the Commission's goal?

20 MR. LANIK: It would be close. It would
21 be right --

22 MR. POWERS: And if they went on to
23 yellow, they would definitely be over the Commission's
24 goal?

25 MR. RAUGHLEY: I don't know where the

1 white -- you may have to get down to the -- the red is
2 25 scrams and that's certainly within --

3 MR. POWERS: An enormous number.

4 CHAIRMAN APOSTOLAKIS: I think the white
5 is 3.

6 MR. POWERS: It seems to bring us back
7 where we were and so I'm wondering why is that white?
8 Why is that a little more extreme if you're
9 essentially undoing everything that the ATWS rule did
10 for you?

11 CHAIRMAN APOSTOLAKIS: You're right.
12 Which is the big question because it was always being
13 what was a rationale because green, white and yellow
14 and most importantly the action matrix.

15 MR. RAUGHLEY: I'm not aware that --

16 CHAIRMAN APOSTOLAKIS: I realize you're
17 not, but this is a good comment.

18 MR. POWERS: I think it's important that
19 this study relate back to the current oversight
20 process.

21 CHAIRMAN APOSTOLAKIS: Sure.

22 MR. POWERS: And ask the questions, have
23 we set these levels correctly in light of this
24 objective of the Commission and this finding that
25 those scrams make a difference.

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1 CHAIRMAN APOSTOLAKIS: Yes, yes. And we
2 may even find that some of these have to be plant
3 specific, huh?

4 MR. POWERS: Well, that would be a
5 stunning revelation, wouldn't it?

6 CHAIRMAN APOSTOLAKIS: Surprise. Okay,
7 any other questions? I think we will have an
8 opportunity to review the oversight process again this
9 year, right? We have an SRM?

10 MR. POWERS: Do you think we'll ever get
11 into the SDP?

12 CHAIRMAN APOSTOLAKIS: There are hopes.

13 (Laughter.)

14 Tom, is this done?

15 MR. KRESS: I think so unless Jack wants
16 to make a few more comments?

17 MR. ROSENTHAL: Just that what we tried to
18 do was -- well, what we did do was publish a draft
19 report, went for public comment. By the way, we
20 always write to UCS with a letter requesting their
21 comments as well as the industry groups.

22 And then -- but still as a draft report,
23 we came before you with a near final product because
24 this gives you an opportunity to influence the final
25 product and some of the observations made on the table

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1 when you said that we'll incorporate in the report.
2 So what I'd like you to do is tell me is this a good
3 way to go about it because we'll be back again in
4 another six months. Or, would you prepare a final
5 product or earlier input and then in terms of your
6 actions -- the choice is in terms of a letter or not
7 or whatever, is just yours.

8 MR. POWERS: I think this is just about
9 exactly right. The timing was just about exactly
10 right.

11 CHAIRMAN APOSTOLAKIS: Are we writing a
12 letter, Tom?

13 MR. KRESS: I am still debating.

14 CHAIRMAN APOSTOLAKIS: Debating.

15 MR. KRESS: I have thoughts on what a
16 draft might look like, but it's not --

17 CHAIRMAN APOSTOLAKIS: So we can discuss
18 this this afternoon.

19 MR. KRESS: We'll have to discuss it this
20 afternoon.

21 CHAIRMAN APOSTOLAKIS: So the staff is not
22 requesting a letter?

23 MR. KRESS: No sir.

24 MR. POWERS: Not even an "atta boy, Jack"?

25 Come on.

1 MR. KRESS: It will be sort of that
2 nature. That's why, I don't know, we sometimes are
3 reluctant to write "atta boy" letters.

4 CHAIRMAN APOSTOLAKIS: Especially to Jack.
5 Is there anything else of substance to be
6 discussed at this point? Thank you very much,
7 gentlemen. We'll recess until 10:15.

8 (Off the record.)

9 MR. KRESS: Can we come back into session,
10 please?

11 The next item on our agenda is an overview
12 of the mixed oxide fuel fabrication facility and with
13 some debate over who it's supposed to be. I'm going
14 to turn it over to Jack Sieber for introducing the
15 subject.

16 MR. SIEBER: Thank you, Mr. Chairman. The
17 licensing of a MOX or a mixed oxide fuel fabrication
18 plant is a relatively new endeavor for the ACRS and
19 the NRC. There is a new standard review plan that
20 covers the staff's responsibilities for that licensing
21 effort. This is sort of a kickoff meeting wherein we
22 learn a little bit about a MOX fuel plant and the
23 schedules and so forth that we will have to keep in
24 order to keep the licensing process for a MOX plant on
25 schedule.

1 With that, I'd like to introduce Tim
2 Johnson who will give the presentation.

3 MR. JOHNSON: Thank you very much. I'm
4 the backup project manager for the MOX fuel
5 fabrication facility project and I appreciate the
6 opportunity to brief you on the status of this
7 program.

8 Before I begin, I'd like to introduce
9 several people who are available to also help me
10 answer your questions: our Deputy Division Director
11 for the Division of Fuel Cycle Facilities and
12 Safeguards, Bob Pearson; my branch chief, Eric Leeds;
13 my Section Chief, Joe Gidder; Patrick Rhodes from
14 DOE's Office of Fissile Material Disposition and Peter
15 Hastings from DOE's Contractor, Duke, Cogema, Stone &
16 Webster who's going to actually build and operate this
17 facility.

18 (Slide change.)

19 MR. JOHNSON: What I'd like to do today is
20 go over a number of different areas. One is to give
21 you an overview of the MOX program and some of its
22 history. I'd like to talk about the NRC licensing
23 process, what we're doing with respect to the National
24 Environmental Policy Act requirements we have. Talk
25 about opportunities for public hearings, what we're

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1 doing in terms of public participation, some of the
2 significant issues that we're dealing with and our
3 schedule.

4 Before I begin though, are there any
5 particular things that you wanted me to focus on as I
6 went through my discussion?

7 (Slide change.)

8 MR. JOHNSON: To begin an overview, I'd
9 like to talk a little bit about the history of this
10 project. The MOX project is part of a bilateral
11 plutonium disposition agreement between the United
12 States and Russia. This agreement was intended to
13 reduce nuclear proliferation. Discussions on this
14 agreement began shortly after the fall of the Soviet
15 Union and the initial agreements were prepared in
16 1993. And I believe you recall that this past summer
17 in June, President Clinton met with Russian Premier
18 Putin and the most significant thing that came out of
19 that summit was an agreement to go forward with this
20 MOX project. And the agreement was formally signed by
21 Vice President Gore and made effective September 1st
22 of 2000.

23 (Slide change.)

24 MR. JOHNSON: The objective of the
25 agreement is to take 34 metric tons of surplus

1 plutonium from the weapons programs and irreversibly
2 convert them to forms that are unusable for weapons.
3 In this approach, the U.S. is going to take 25 metric
4 tons of material and convert it into mixed oxide fuel
5 for use in commercial reactors and the remaining 9
6 metric tons would be immobilized with vitrified high
7 level waste.

8 The Russians are planning on converting
9 all of their material into mixed oxides fuel and under
10 the agreement both of the programs within the United
11 States and Russia are going to roughly precede and
12 parallel in terms of schedules and timing.

13 As part of the plutonium disposition
14 program, DOE prepared an overall programmatic
15 environmental assessment that was published in
16 November of 1999 and following that, there was a
17 record of decision in January 2000 and in this EIS and
18 record of decision, DOE evaluated a number of options
19 for dispositioning the excess plutonium and they
20 looked at what you could do with it and also the
21 locations of DOE facilities where these operations can
22 take place.

23 The record of decision makes a
24 determination that DOE would undertake what's called
25 a hybrid approach that involves making MOX fuel out of

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1 a portion of the surplus plutonium immobilizing the
2 rest of it.

3 Under the approach of making mixed oxide
4 fuel, the whole program involves taking a weapons
5 pits, disassembling them, doing a chemical conversion
6 from plutonium metal into an oxide form. The next
7 phase would be to take that oxide, make fuel with it
8 and the next phase would be, of course, to use it in
9 commercial reactors.

10 For the mobilization project, what that
11 involves are materials that have significant
12 impurities that don't make it easily adaptable to
13 mixed oxide fuel and for this material DOE would
14 convert the plutonium which is in various forms to a
15 ceramic form. They would put this material in small
16 containers and encapsulate those containers in with
17 vitrified high level waste.

18 The record of decision also decided that
19 these operations would take place at the Savannah
20 River site. DOE investigated a number of facilities
21 throughout the country for it and settled on the
22 Savannah River site. DOE also decided to place a
23 contract with a consortium of Duke Engineering, Cogema
24 and Stone & Webster Engineering Corporation to do the
25 mixed oxide fuel fabrication and also be responsible

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1 for using it in the reactors.

2 MR. SEALE: Excuse me, I probably missed
3 something earlier. The 34 metric tons that the U.S.
4 would be reasonable for taking care of here is matched
5 by another 34 approximately that the Russians will
6 retain?

7 MR. JOHNSON: Yes.

8 MR. SEALE: Where does this set in the
9 total of the amount of material that we either know or
10 think that the Russians have that might be --

11 MR. JOHNSON: I think it's a relatively
12 small amount.

13 MR. SEALE: I would think so too. So this
14 is sort of skimming the oxide slag off the top of the
15 crucible, I would imagine.

16 MR. JOHNSON: That's my understanding that
17 this is a small percentage of the total amount of
18 weapons material.

19 MR. SEALE: Yes. I just wanted to keep
20 the perspective.

21 (Slide change.)

22 MR. JOHNSON: This next slide kind of
23 diagrammatically shows what the overall process is.
24 The weapons plutonium will come into the Savannah
25 River site and under DOE jurisdiction and oversight

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1 they will disassemble the pits and chemically convert
2 the plutonium into an oxide and that material will go
3 to the mixed oxide fuel fabrication facility which is
4 under NRC licensing responsibility and from there the
5 fresh MOX fuel will be used at the Catawba and McGuire
6 Stations in their reactors.

7 MR. POWERS: Do you have any insights on
8 why ICE condenser plants are chosen for this?

9 MR. JOHNSON: Why these two plants?

10 MR. POWERS: Yes, I mean they're ICE
11 condensers, aren't they?

12 MR. SEALE: Yes.

13 MR. POWERS: Why are ICE condensers
14 particularly suited for MOX fuel I guess comes to
15 mind.

16 MR. JOHNSON: I don't know if that was a
17 consideration in the selection of these plants.

18 MR. UHRIG: I suspect it's more related to
19 Duke. They operate those, one of the three partners.

20 MR. POWERS: They operate other things
21 too. I just wondered if ICE condensers had some
22 peculiarity about them that I didn't know other than
23 vulnerable containment.

24 (Laughter.)

25 MR. KRESS: You were reading my mind.

1 MR. POWERS: I saw you grinning over
2 there.

3 (Slide change.)

4 MR. JOHNSON: The fuel fabrication process
5 is going to involve two primary activities. The first
6 step is an aqueous polishing. The plutonium that
7 comes from weapons does contain some impurities,
8 primarily gallium and americium that are desired to be
9 removed and in the removal of these materials,
10 impurities, the proposal here is to use a liquid
11 process, an aqueous process based on a scrap recovery
12 process used at the La Hague processing facility that
13 Cogema operates in France.

14 MR. KRESS: Does that require you to grind
15 the plutonium up into a powder?

16 MR. JOHNSON: The plutonium will already
17 be in a powder.

18 MR. KRESS: You receive it in a powder
19 form?

20 MR. JOHNSON: Right, it will be received
21 in a powder. And the first step would be nitric acid
22 dissolution, a solvent extraction as an oxalate
23 dissipation step and calcination back into an oxide
24 form.

25 MR. POWERS: When you say it's received as

1 a powder is that because it's coming from the calcium
2 reduction process as particulates or is it a powder of
3 oxide?

4 MR. JOHNSON: Right. DOE is going to turn
5 over to the fuel fabrication facility an oxide after
6 they do their conversion.

7 MR. POWERS: Okay, so we've got some
8 serious criticality headaches here ahead of us.

9 MR. JOHNSON: Criticality is one of the
10 most important parts of our review.

11 MR. SEALE: Now, are they on the -- to
12 what extent are those headaches on the NRC side of the
13 fence and to what extent are they on the DOE side of
14 the fence?

15 MR. JOHNSON: Both.

16 MR. POWERS: If we're going to dissolve a
17 nitric acid solution and do stuff with it and you're
18 going to avoid the precipitation problem, you've just
19 got headaches because you got to control that nitric
20 acid pretty carefully.

21 MR. SIEBER: Is this a PUREX type process?

22 MR. JOHNSON: It's similar to the PUREX
23 process.

24 MR. SIEBER: Whose responsibility is it to
25 control the particle size at precipitation stage?

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1 MR. JOHNSON: It will be --

2 MR. SIEBER: DOE?

3 MR. JOHNSON: It will be DCS's
4 responsibility. What these processes are are
5 processes that will come under the fuel fabrication
6 piece of it --

7 MR. SIEBER: So the polishing is part of
8 fabrication?

9 MR. JOHNSON: Correct. And again, this
10 process is a process that is taking place now in the
11 La Hague facilities so there is a good deal of
12 experience in using it and the La Hague designs are
13 basically going to be used at this facility.

14 MR. SIEBER: There is a PUREX plant in
15 Hanford and also West Valley used a PUREX process too.

16 MR. JOHNSON: Now this is different, a
17 little bit different than just reprocessing. This is
18 a scrap recovery process that is used at La Hague.

19 MR. SIEBER: Okay.

20 MR. UHRIG: Is the removing of these
21 impurities because it affects the fabrication of the
22 fuel or because it affects the operating
23 characteristics of the plant?

24 MR. SIEBER: They have a pretty tight
25 specification for the operator based on operational

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1 use and they want to minimize obviously any impurities
2 that they can.

3 MR. UHRIG: It would affect the operating
4 characteristics of the plant, as well as the waste --

5 MR. JOHNSON: I think the concern is more
6 of the operating characteristics of the fuel than the
7 reactor.

8 MR. UHRIG: Okay. Americium has a pretty
9 good cross section, as I recall.

10 MR. JOHNSON: Right.

11 MR. SEALE: Could I ask -- the aqueous
12 polishing is part of the fuel fabrication process?

13 MR. JOHNSON: Yes.

14 MR. SEALE: Is it part of the fuel
15 fabrication process for which the NRC is responsible
16 for the licensing?

17 MR. JOHNSON: Yes.

18 MR. SEALE: So everything on this chart
19 here, ultimately the NRC is going to have as a
20 concern?

21 MR. JOHNSON: Right.

22 MR. SEALE: For licensing.

23 MR. JOHNSON: Right. We're going to be
24 responsible for the oversight of both of these
25 processes here on the slide.

1 The next phase after the impurities are
2 removed, the plutonium would go into more of a
3 standard fuel fabrication process and with the
4 exception of the fact that the use here is plutonium
5 and depleted uranium, rather than low enriched
6 uranium, the rest of this fuel fabrication process is
7 very similar to what takes place in a normal uranium
8 fuel fabrication. There would be mixing and blending.
9 The material would be pressed into pellets. The
10 pellets would be centered in a reducing environment.
11 They would be ground to a specification and then put
12 in fuel rods and ultimately into fuel assemblies. And
13 again, this process for fuel fabrication is based on
14 the existing process now at the MELOX facility in
15 Marcul, France.

16 In Cogema, one of the partners in the
17 consortium has been making MOX fuel for about 20 years
18 and MOX fuel is being used right now in 35 reactors in
19 Europe, 20 of which are in France.

20 MR. SEALE: Could I ask, is that process,
21 you say it's similar. Does the similarity go so far
22 as to allow hand contact, or is this a remote process?

23 MR. JOHNSON: This is a remote process
24 from the point of getting the plutonium canisters in
25 from the DOE facility to the point where the fuel rods

1 are taken and assembled into assemblies. But the
2 entire operation is done remotely in glove boxes.

3 MR. UHRIG: Is the enrichment comparable
4 to ordinary fuel?

5 MR. JOHNSON: The plutonium percentage
6 will be about 4 to 5 percent and the rest will be
7 depleted uranium.

8 MR. POWERS: In NRC's examination of this
9 facility, carrying out its regulatory
10 responsibilities, is fuel quality part of that or not?

11 MR. JOHNSON: Well, one of the steps in
12 the NRC program is to evaluate the qualification data
13 for the fuel. Part of the -- this is outside of the
14 fuel fabrication project, but in terms of the use and
15 the reactors, NRC is going to be evaluating that and
16 like I said it kind of opens up our next slide here.

17 (Slide change.)

18 MR. POWERS: Which is the depth of
19 darkness.

20 MR. UHRIG: That is a true Freudian slip.

21 MR. JOHNSON: Yes. One of the pieces in
22 our review is the reactor piece on the qualification
23 of the fuel. It's outside of the fuel fabrication
24 project, but it is something we're involved in and the
25 steps will be -- they'll be two lead test assemblies

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1 that will be produced and they will be radiated at the
2 McGuire Station and data from that will be used in
3 qualifying the entire program and one of the issues
4 that I can talk about this a little bit later, but one
5 of the primary issues right now is who is going to
6 make those lead test assemblies. Originally DOE was
7 going to use the Los Alamos facility to fabricate the
8 lead assemblies, but that was changed and right now
9 the proposal is to use material, plutonium, from the
10 United Kingdom, have the fabrication done in France
11 and have that fuel shipped over here.

12 So yes, part of our program is to evaluate
13 the fuel use and qualify it for the whole program.

14 MR. UHRIG: Do you have estimates of the
15 burn up that would be allowed in fuel of this sort?
16 Is it 30, 40, 50,000 megawatts --

17 MR. JOHNSON: It will be on the order of
18 40,000.

19 MR. UHRIG: What would the plutonium
20 content at that point be? Do you have any --

21 MR. JOHNSON: It's about the same.

22 MR. UHRIG: Is it generated about as fast
23 as --

24 MR. JOHNSON: There are some numbers. I
25 don't recall.

1 Peter, do you recall what the numbers are?
2 MR. HASTINGS: I don't have those numbers
3 with me.

4 This is Peter Hastings. I don't have that
5 number off the top of my head, no. We can get it.

6 The final plutonium concentration of spent
7 fuel is about 2.5 percent. The IC topics are
8 dramatically shifted from 93 down to the 59 range.

9 MR. UHRIG: Thank you.

10 (Slide change.)

11 MR. JOHNSON: Again, the areas of the NRC
12 review involve the licensing of the fuel fabrication
13 facility and that is required by law. It was -- the
14 law was 1999 Defense Authorization Act that required
15 the NRC to license a plutonium fuel fabrication plant
16 where the fuel was going to be used in commercial
17 reactors.

18 We're also going to be involved in some
19 transportation aspects. The proposal is that there
20 will be a new package designed for transporting the
21 fresh fuel from the fuel fabrication facility to the
22 reactors and NRC will certify that package.

23 Again, for the reactors, we'll be
24 licensing the use of the fuel at the McGuire and
25 Catawba Stations and NRC would also be licensing the

1 disposal of the spent fuel at the high level waste
2 repository.

3 (Slide change.)

4 MR. JOHNSON: For the fuel facility, we're
5 going to be using a two-stage licensing process and
6 this process falls out of our regulations which
7 requires us to issue a construction approval prior to
8 construction. This is a little bit different from the
9 way normal uranium fuel fabrication facilities are
10 licensed. It doesn't require approval prior to
11 construction. And this process is also -- turns out
12 to be most convenient for the applicant. They have a
13 requirement to irradiate MOX fuel in 2007 and they
14 feel that they can best do this by submitting its
15 application in two pieces. One is a construction
16 application which is due at the end of this month and
17 the second would be an operating license application
18 and that's scheduled to be submitted in June of 2002.

19 (Slide change.)

20 MR. JOHNSON: For the construction
21 authorization, the regulations require that the
22 application include a site description, a safety
23 analysis of the design bases of the principal
24 structures, systems and components and also quality
25 assurance program. And in order for us to approve the

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1 construction application, we're going to need to
2 conclude that the environment will be protected and
3 that the principal structures, systems and components
4 are going to provide reasonable assurance against
5 projection for natural hazards and accidents.

6 MR. SIEBER: When this facility is
7 finishing processing the 25 metric tons of heavy
8 metal, is that the end of the facility or would you
9 contemplate additional processing as time goes on?

10 MR. JOHNSON: The current program now is
11 the facility would operate for 20 years. At this
12 point, DOE hasn't decided what the future uses of the
13 facility will be, but I mean it is conceivable that it
14 could be used for additional processing, if that's
15 what the decision is or it could be deactivated and
16 perhaps used for other things. But as of right now,
17 DOE has not indicated what uses beyond the 20 years of
18 operation will be.

19 MR. POWERS: Does the disposal or
20 decommissioning of the facility, is that an NRC
21 oversight responsibility or does it revert to DOE's
22 responsibility?

23 MR. JOHNSON: Under the contract that DCS
24 has with DOE, the facility would revert to DOE and
25 DCS's responsibilities would be to deactivate it, to

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1 place a facility in a safe, shutdown mode and then it
2 would be turned over to DOE and DOE could make
3 decisions on further use or dismantlement if they
4 wish.

5 MR. SIEBER: The EIS does not discuss
6 anything about decommissioning, I presume?

7 MR. JOHNSON: Other than what I just said.

8 MR. SIEBER: Okay.

9 MR. JOHNSON: Because there isn't a
10 decision yet that it would be decommissioned after
11 operation. The environmental report just indicates
12 that it would be turned over to DOE and final
13 decisions on its use would be made later.

14 MR. SIEBER: It seems to me that 25 metric
15 tons is not a lot of material. I presume that to
16 operate for 20 years, you're going to have to have
17 additional feed stock?

18 MR. JOHNSON: Right. But the project is
19 really intended to provide about a third of a core for
20 four reactors for 20 years, so you're correct, it's
21 not a great deal of material.

22 (Slide change.)

23 MR. JOHNSON: As I mentioned, there are
24 two parts to the whole licensing project. One is
25 construction authorization and the other is review of

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1 an operating license application. And for the
2 operating license application, we would address the
3 overall safety analyses, the detailed design of the
4 facility, management measures, emergency plans,
5 physical protection plans and materials accountability
6 plans.

7 (Slide change.)

8 MR. JOHNSON: One the most important
9 things that's a part of our licensing process is the
10 preparation of the environmental impact statement.
11 And this, of course, is required for all major federal
12 activities and it's also explicitly required under
13 Part 51 for fuel fabrication facilities. So we are
14 going to be preparing an EIS for this activity.

15 One of the benefits we have though, as I
16 mentioned before, DOE has prepared a programmatic EIS
17 in a Record of Decision and we're hoping to be able to
18 use a lot of that material and not have to regenerate
19 material that's already been done by DOE.

20 MR. KRESS: In the EIS I'm familiar with,
21 the nuclear part uses a source term for fission
22 products.

23 MR. JOHNSON: Yes.

24 MR. KRESS: Will you use that same source
25 term for this fuel, you think, that's used in the

1 normal EISs?

2 MR. JOHNSON: Are you referring to Table
3 S-3?

4 MR. KRESS: Yes.

5 MR. JOHNSON: I don't really know the
6 details of Table S-3, but we'll try to use what's
7 already been used, if it's appropriate. If it's not
8 appropriate, we're going to have to generate our own
9 source term based on information on the design of the
10 facility.

11 And again, we're going to try to use as
12 much of the DOE EIS as possible, but because the DOE
13 EIS dealt with the facility and the impacts on a very
14 broad level, there will be a need to review it at the
15 detailed design level of our application.

16 (Slide change.)

17 MR. JOHNSON: The process that we'll be
18 using is the standard process that's described in Part
19 51. We've already received the environmental report.
20 Our next step will be to issue a Notice of Intent to
21 Prepare an EIS. We'll start a scoping process. Our
22 intent at this point is to have scoping meetings at
23 three locations, one in August, Georgia near the
24 Savannah River site; also in Savannah, Georgia and
25 Charlotte, North Carolina. The Charlotte, North

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1 Carolina site is so that we can get public input from
2 people in the vicinity of the two reactors that will
3 end up using this fuel.

4 (Slide change.)

5 MR. JOHNSON: We'll do the coordination
6 with federal and state agencies and the product of the
7 scoping will be a scoping summary report upon which
8 we'll develop a draft EIS, receive public comments and
9 then issue a final EIS.

10 It turns out that for licensing, the EIS
11 is a critical part of our schedule development and our
12 goal here is to try to prepare a final EIS in 18
13 months and that's going to be a very aggressive
14 schedule, but the EIS people think that they can do it
15 primarily because we'll be able to use a lot of the
16 information from the DOE's prior EIS.

17 MR. SIEBER: That's 18 months from the art
18 of the NEPA process?

19 MR. JOHNSON: From the application date.

20 MR. SIEBER: Which is March?

21 MR. JOHNSON: Which is the end of this
22 month.

23 MR. SIEBER: Okay.

24 (Slide change.)

25 MR. JOHNSON: The next thing I'd like to

1 talk about are opportunities for public hearing and I
2 think you're aware that there's a great deal of
3 interest in use of MOX fuel and opportunities for a
4 public hearing are going to be an important factor in
5 our licensing process.

6 Basically, because of the two step
7 licensing in which we receive a construction
8 application and then an operating license application,
9 there will be two opportunities for a hearing, one at
10 the construction authorization stage and this hearing,
11 if it's -- if one takes place, will be limited to
12 issues related to our authorization of construction.
13 And likewise, for operating, those issues involved
14 with that hearing would be limited to those issues on
15 which we base a decision on issuing an operating
16 license.

17 The intent would not be to relitigate
18 construction authorization issues at the operating
19 approval stage. And under the requirements of Part 2,
20 the hearing proceedings would be the informal hearing
21 proceedings in Subpart L.

22 MR. SIEBER: Are NRC folks participating
23 in DOE's preparation for their part of the EIS?

24 MR. JOHNSON: Well, DOE's EIS has already
25 been prepared.

1 MR. SIEBER: And there's public hearings
2 going on?

3 MR. JOHNSON: Well, that's already been
4 completed.

5 MR. SIEBER: Everything is done?

6 MR. JOHNSON: Right, and the record of
7 decision was issued in January of 2000 on that, but
8 there were a whole series of public meetings that DOE
9 undertook in their overall programmatic EISs and those
10 meetings occurred across the country, primarily
11 because at that time they were evaluating where these
12 -- the plutonium disposition activities would take
13 place and ultimately the decision by DOE was to have
14 these activities take place at the Savannah River
15 site.

16 MR. KRESS: Is there any plants for PRA at
17 the Savannah River site?

18 MR. JOHNSON: I am not sure I completely
19 understand your question, but for the MOX facility,
20 one of the requirements in Part 70 is to do an
21 integrated safety assessment.

22 MR. KRESS: An ISA.

23 MR. JOHNSON: And that will be applicable
24 to the fuel fabrication project and it's our
25 expectation that the integrated safety assessment

1 would use both a qualitative and quantitative
2 evaluation as part of their integrated safety
3 assessment.

4 Another important activity is public
5 participation. I think you're aware that that's one
6 of the strategic goals of our Agency and in response
7 to that, we've prepared a project communications plan
8 in December and in there it describes a number of
9 activities that we will be using to encourage
10 participation. We obviously have the NEPA process
11 that involves scoping meetings and other meetings in
12 going through the EIS process. We'll have two
13 opportunities for hearings. We'll have periodic
14 public meetings. Last July, we did have a public
15 meeting. We had actually two of them. One was in
16 Augusta and the other was in Columbia, South Carolina
17 to introduce people to the NRC. People in the
18 Savannah River area are very familiar with nuclear
19 issues, but most of them aren't familiar with NRC
20 licensing activities because their involvements have
21 been primarily dealing with DOE.

22 So this was an opportunity for us to kind of explain
23 the differences in our roles with respect to DOE and
24 the program.

25 We've also established a website for the

1 MOX project. We're going to be publishing a
2 newsletter. The first issue will be out within the
3 next two months and of course, there's the normal
4 availability of ADAMS for other documents. Our MOX
5 site is intended to allow easy access to some of the
6 major documents that we produce, but it won't have all
7 of the correspondence and memorandum related to the
8 project, but that information can be obtained through
9 the normal public access to ADAMS.

10 MR. SIEBER: Who will be the recipients of
11 the MOX newsletter?

12 MR. JOHNSON: We have generated a mailing
13 list and we'll be expanding that as people want copies
14 of it.

15 MR. SIEBER: Yeah, but what types of
16 organizations or individuals are on that list right
17 now?

18 MR. JOHNSON: It will be internally within
19 the NRC. It will also be externally to the applicant,
20 to DOE and individual members of the public that have
21 been involved in the public meetings and other
22 activities and that have requested to be put on the
23 mailing list. But there are a number of intervenor
24 groups that have shown interest in this project and
25 they will be on the distribution list for the

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1 newsletter.

2 MR. WALLIS: How does the website work?
3 Is it mostly a source for documents or is it an
4 opportunity for dialogue?

5 MR. JOHNSON: Both.

6 MR. WALLIS: Do you have experience with
7 the dialogue?

8 MR. JOHNSON: Well, no, the dialogue piece
9 isn't quite in place at the present time, but we're
10 working with our Office of -- our Chief Information
11 Officer to get that, but the overall objective is to
12 provide not only a place to go for information and
13 easy access to some of the significant documents, but
14 it would also allow comment on documents and allow
15 people to see the comments and others to comment on
16 those comments.

17 MR. WALLIS: It's not going to be a chat
18 room thing where conversations are carried on, is it?

19 MR. JOHNSON: Yes, it could be that.

20 MR. WALLIS: That kind of thing, okay.

21 MR. JOHNSON: But the Agency does have,
22 does use that in a number of other of their websites
23 and it's our intent to adopt that into this.

24 (Slide change.)

25 MR. JOHNSON: Some of the significant

1 issues that we're wrestling with at this point in time
2 involve a couple of areas. One is technical issues.
3 Since fall of 1999 we've been conducting a series of
4 technical meetings with DCS with the objective of
5 ensuring that we get an understanding between both
6 parties as to what the application should look like.
7 Our desire is to get a complete application that will
8 not require a large number of requests for additional
9 information.

10 And these technical meetings have, I
11 think, have been pretty good. We recently completed
12 one regarding design bases. As I mentioned, one of
13 the elements for making a determination on a
14 construction authorization is to evaluate the design
15 bases of principal systems, structures and components
16 and we wanted to make sure we had an understanding of
17 the level of detail that would be necessary for us to
18 do the review. And in early January we had a two-day
19 meeting to talk about that.

20 Other areas relate to seismic design,
21 safeguard security issues. We've had discussions on
22 glove box materials, accident analyses, how to define
23 the controlled areas and so on.

24 Another issue I talked about earlier was
25 the production of lead test assemblies. Again, one of

1 our jobs will be to review the qualification data that
2 comes from these lead test assemblies to ensure that
3 the actual MOX fuel can be used safely at the Catawba
4 and McGuire Stations.

5 With regard to security, there are a
6 number of overlapping areas of responsibility we found
7 between DOE and NRC on a number of security issues and
8 clearance issues. This facility is going to be done
9 under DOE contract. It's going to be done under DOE
10 site and in order to resolve some of these overlapping
11 security issues we're in the process of preparing a
12 Memorandum of Understanding with DOE to outline what
13 our responsibilities are and what DOE responsibilities
14 will be.

15 Another important consideration is this is
16 really the first application of the revised Part 70
17 requirements and the new Part 70 introduces integrated
18 safety assessments which haven't been required in the
19 past and this will be our first opportunity to really
20 put an application through the mill on this.

21 MR. WALLIS: Does that include
22 transportation?

23 MR. JOHNSON: Pardon?

24 MR. WALLIS: That includes transportation,
25 Part 70?

1 MR. JOHNSON: No.

2 MR. WALLIS: It doesn't.

3 MR. JOHNSON: Part 70 is for the fuel
4 fabrication facility itself.

5 Part 71 is the transportation
6 requirements.

7 MR. WALLIS: Okay.

8 MR. JOHNSON: And that will be used to
9 certify the package that will be used for fresh fuel
10 shipments to the reactors.

11 MR. WALLIS: Are you also concerned with
12 the shipment of the powder or is that DOE?

13 MR. JOHNSON: Well, DOE is going to be
14 principally responsible for transporting the powder
15 from their conversion facility to the fuel fabrication
16 facility, but once it enters the jurisdiction of DCS,
17 it will be part of our responsibility. But the
18 package that will be used will be developed by the
19 Department of Energy.

20 MR. SIEBER: I have a couple of questions.
21 Going back to the lead test assembly bullet there. To
22 use mixed oxide fuel in a commercial reactor in steady
23 state is not particularly challenging, but if you have
24 nuclear transients, particle size makes a pretty big
25 difference, for example, a reactivity pulse to a mixed

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1 oxide fuel assembly creates a hot particle at the MOX
2 particle point which could, for example, perforate
3 clad.

4 What's the data base that will be used to
5 assure that specifications for the mixed oxide
6 materials are suitable to take care of these nuclear
7 transients and other effects?

8 MR. JOHNSON: The data base will be the
9 European experience of 20 years of operations and
10 also, the qualification data from the lead test
11 assemblies.

12 Again, I mentioned earlier that there are
13 currently 35 European reactors that use MOX fuel and
14 there is a substantial data base from that and DCS
15 intends on using that in their fuel qualification
16 program.

17 MR. POWERS: I think it is also true,
18 however, that the isotopic mixture used in the
19 European reactors is substantially different.

20 MR. JOHNSON: It is slightly different in
21 terms of the isotopics and that again is one of the
22 reasons for the lead test assembly program to verify
23 the similarities in the actual operation data.

24 MR. POWERS: In the past, a lot of the
25 lead test assemblies have been located in fairly

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1 benign locations in the core. We perhaps learned from
2 high burn up fuel it's not a good idea to do that.
3 Are we going to locate these late test assemblies in
4 more aggressive parts of the core?

5 MR. JOHNSON: I don't know the answer to
6 that, but -- is there someone else?

7 MR. CARUSO: This is Ralph Caruso from
8 NRR. Yes, for the retest assemblies for MOX, we are
9 encouraging DCS to load these assemblies in, not
10 necessarily the limiting locations in the core, but
11 near the limiting locations so that they're burned in
12 a prototypical fashion.

13 MR. SIEBER: Getting back to the hot
14 particle issue, what comes to my mind is the work of
15 Battelle Northwest, did it at Hanford in the 1970s on
16 the plutonium utilization project where they actually
17 test fuel rods with mixed oxide fuel under some of
18 these conditions. Perhaps that should be a part of
19 the database that one uses in order to cite
20 characteristics the pellets should have.

21 MR. JOHNSON: A lot of people feel that
22 the United States just has never done anything with
23 MOX, but that's really incorrect.

24 MR. SIEBER: That's not true.

25 MR. JOHNSON: In fact, in the late 1960s

1 and early 1970s, there was a substantial mixed oxide
2 fuel program in the United States.

3 MR. SIEBER: That's right.

4 MR. JOHNSON: Although since the 1970s, it
5 hasn't been used. But you know, your particle size
6 question is a major concern and that's one of the
7 critical components in the development of the fuel is
8 to ultimately get the appropriate particle sizes and
9 homogenization in the actual fuel pellets.

10 MR. SIEBER: Right. An additional
11 question. When you talk about the security of mixed
12 oxide fuel, when you ship a new unburned fuel assembly
13 from the fabrication plant to the reactor, does that
14 follow the rules of shipping special nuclear material
15 or is it something greater than that since --

16 MR. JOHNSON: It would fall under the
17 transportation regulations.

18 MR. SIEBER: Well, it would seem to me
19 that some relatively simple chemical processing could
20 be used to concentrate the plutonium and separate it
21 from the depleted uranium just as it was put together
22 in the first place, say as opposed to slightly
23 enriched uranium where making a more fissile material
24 is virtually impossible without a diffusion plant or
25 centrifuge or something like that.

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1 You see what I mean?

2 MR. JOHNSON: No, could you --

3 MR. SIEBER: Well, you could take this
4 fuel assembly, put it in nitric acid, again, run it
5 through an organic separation process and separate the
6 uranium from the plutonium.

7 MR. JOHNSON: This is after the radiation?

8 MR. SIEBER: No, this is at the point
9 where it leaves the fabrication plant, before it's
10 inserted into the reactor. So you end up with high
11 grade plutonium again after you do that which would be
12 an opportunity for somebody --

13 MR. JOHNSON: Right, well, the security of
14 that shipment will be an important consideration.

15 MR. SIEBER: Okay. You would take
16 something like that into consideration?

17 MR. JOHNSON: Yes. And the security plans
18 for use at the reactors, as well as the transport will
19 be a key thing for our review.

20 MR. SIEBER: Well, once it's installed in
21 the reactor and becomes irradiated, it actually has
22 all the same safeguards that normal uranium fuel would
23 have. It's too hot to handle easily.

24 MR. JOHNSON: Correct, and I understand
25 that the time that the fuel, the fresh fuel is at the

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1 reactor site, they're going to try to minimize that to
2 the extent possible because that is recognized as a
3 vulnerable period for that in terms of safeguards.

4 MR. SIEBER: Right.

5 MR. JOHNSON: Pete, did you have something
6 you wanted to say?

7 MR. HASTINGS: Yes, this is Peter
8 Hastings. Let me clarify. The fresh fuel shipment
9 from the MOX facility to the mission reactors will be
10 in a Part 71 certified shipping container in terms of
11 safety requirements, but it will be under DOE safe
12 secure transport and so it will be within the DOE
13 security provisions and then once it's received at the
14 reactors, the current plans are to load it directly
15 into the spent fuel pool and not into a dry, fresh
16 fuel storage.

17 MR. POWERS: If we look at this
18 transportation cask, do we have an understanding of
19 what happens in the event of an accident on these fuel
20 rods crushing or shattering?

21 (Pause.)

22 MR. RHODES: Yeah, the answer to that is
23 there's a series of tests for the packages. It's Type
24 B package and it will go through a series of tests
25 under Part 71 regulations.

1 I'm Patrick Rhodes. I'm the MOX program
2 manager for DOE.

3 MR. POWERS: That will contain some sort
4 of fuel rod mock up or an actual fuel rod?

5 MR. RHODES: The test is going to be done,
6 we'll have three assemblies, two of which are mock,
7 one of which is a realistic assembly, a paratypical
8 assembly and they'll actually measure the distortions
9 after the drop test.

10 MR. POWERS: And that's a drop test, how
11 about accident test?

12 MR. RHODES: Well, in the Part 71
13 regulations it specifies the series of tests one has
14 to do. By analysis, it's fire, it's drop, it's
15 perforation and puncture and maybe others and it will
16 by demonstration, testing or analysis demonstrate all
17 those requirements.

18 MR. JOHNSON: The remaining issue that is
19 kind of at the forefront has to do with the hearing
20 process. Under the regulations you would use the
21 informal Subpart L hearing proceedings. However,
22 there are some stakeholders that want to see the
23 formal Subpart G hearing proceedings used and so I
24 think that will probably end up getting sorted out as
25 a -- if there is a hearing.

1 Did you have a question?

2 (Pause.)

3 (Slide change.)

4 MR. JOHNSON: The next thing I'd like to
5 talk about is some of the things we've done and our
6 schedule for the rest of the process.

7 We've prepared a standard review plan for
8 review of the mixed oxide fuel fabrication project.
9 That was completed in August of 2000. I mentioned
10 that we have a MOX website on line. We've been having
11 a series of technical meetings with DCS and DOE. We
12 had the public meeting last July in South Carolina.
13 In December, we received the environmental report for
14 the fuel fabrication facility. We expect to get the
15 application for construction authorization at the end
16 of this month. We would expect that we can complete
17 the review for construction authorization in September
18 2000 so that construction can begin at that time. We
19 expect an operating license application in June of
20 2002.

21 On the reactor side, in order to use the
22 lead test assemblies, we're going to need to receive
23 an amendment. That is expected in August 2001. We
24 expect the irradiation of those lead test assemblies
25 to begin in October 2003. We expect the license

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1 amendment for the use of the MOX fuel, other than the
2 lead test assemblies, at both McGuire and Catawba to
3 be submitted in January 2004 and the objective of DCS
4 is to begin fuel irradiation in September 2007.

5 MR. WALLIS: There must be a detailed plan
6 of what you can learn from this radiation of the lead
7 test assemblies?

8 MR. JOHNSON: Yes. NRR and Research are
9 very much involved with DCS and DCS's contractor,
10 Framaton in doing the fuel qualifications studies,
11 that program is -- Framaton had submitted to us an
12 overall qualification plan that is currently under
13 review by NRR.

14 MR. SIEBER: The capacity of the fuel
15 fabrication plant is such that you could actually
16 provide reload for four reactors?

17 MR. JOHNSON: It's intended to provide a
18 third of a core for each of four reactors over 20
19 years.

20 MR. SIEBER: So do you -- is there a
21 thought about who the other two reactors will be?

22 MR. JOHNSON: The four reactors are at
23 McGuire 1 and 2 and at Catawba 1 and 2.

24 MR. SIEBER: Okay.

25 MR. POWERS: I'm telling you, there's

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1 something unique about a nice condenser of MOX fuel.

2 MR. SIEBER: It sounds like it should be
3 going in to cook.

4 MR. JOHNSON: Well, that concludes my
5 remarks. If you have any questions, I'll be happy to
6 try to answer them.

7 Basically, I tried to talk about the
8 history of the MOX program, our licensing process, how
9 we're going to deal with the EIS in preparation of
10 that, public hearings, public participation and our
11 schedules and if you have any additional questions,
12 I'll try to answer them for you.

13 MR. POWERS: I have a comment for -- not
14 for you, but for the rest of the Committee. If you
15 look at the schedule, you see that it goes out to 2007
16 which means that most of the Members on the current
17 Committee will not see the end of this process. So
18 we're going to have to establish some sort of a
19 procedure for continuity throughout this so that
20 people -- the institutional memory is going to atrophy
21 if we don't do something fairly formal in this
22 process.

23 We need to struggle with that, actually to
24 the extent of going through a documented plan to
25 assure that we have some continuity in this process.

1 MR. SIEBER: I think that that is a good
2 point. I think that we're going to have to have some
3 kind of a subcommittee meeting early this summer or
4 late spring and that certainly is one of the things
5 that we will need to address at that time.

6 I think the other one is the Standard
7 Review Plan. We should probably attack that the same
8 way that we addressed license renewal where we divide
9 up the section among the members so that each of us
10 has an expertise and a certain part of the review
11 process and I know that I have a copy of that SRP, but
12 I don't know if it's been distributed to -- everybody
13 has it.

14 MR. SIEBER: I think -- well, it's not
15 that big.

16 MR. POWERS: Are you going to be asking
17 the reactor fuels subcommittee to look at these LTA
18 amendments?

19 MR. SIEBER: I think that last week when
20 we redistributed the work amongst the various
21 subcommittees of the ACRS, the fuels folks actually
22 inherited a substantial portion of the overall
23 responsibility for completing ACR's work with regards
24 to the facility. On the other hand, at the same time,
25 fire protection is heavily involved and that's why we

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1 got the assignment initially. So I see us working
2 together and perhaps even forming a special ad hoc or
3 special subcommittee just to handle issues here.

4 I also would point out to me the schedule
5 seems very aggressive, which means that there will be
6 a fair amount of work, both on the part of the NRC,
7 DOE, the applicant and the ACRS and so I think it's
8 important for us to keep that in mind so that we don't
9 end up impeding progress on this process.

10 Does anybody else have any comments at
11 this time?

12 MR. LEITCH: There's a sense here in the
13 Standard Review Plan that -- in the Executive Summary,
14 that I was just wondering if you could expand upon a
15 little bit. It says the NRC staff has attempted to
16 ensure that this SRP is consistent with the
17 requirements of on-going rule making. Could you say
18 a word or two about what that means?

19 MR. JOHNSON: Yeah, basically what that
20 means is our schedule for producing the standard
21 review plan was actually ahead of the promulgation
22 schedule for the revised Part 70. And we tried to
23 incorporate the thinking that was going into the
24 revised Part 70 as we went ahead, even though it
25 hadn't been finally promulgated.

1 MR. LEITCH: Thank you.

2 MR. JOHNSON: And it turns out, I think
3 the revised Part 70 was ended up promulgated a month
4 or two after publication of the SRP, so there wasn't
5 a great deal of time and change between the two
6 products.

7 MR. LEITCH: Okay, thanks.

8 MR. SIEBER: I guess at this time I'd like
9 to ask if since we have DOE representatives here, if
10 they have anything they would like to state or add to
11 the presentation?

12 MR. RHODES: Thanks for the opportunity.
13 My name is Patrick Rhodes. I'm the manager of that
14 activity. Let me first start with a couple of little
15 minor corrections.

16 Tim said the facility will operate for 20
17 years. Actually, that is its design operating
18 lifetime, but we're actually only expecting it to be
19 12 or 13 years. We're expecting initial production in
20 2007, final production in something like 2019.

21 Second one is this facility is designed
22 nominally for 70 metric tons, heavy metal throughput
23 per year which is more than enough for six or seven or
24 eight reactors. Realistically, if one wanted to push,
25 I'm sure we could even get more through it than that.

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1 When this contract was originally awarded
2 to the DCS contract, the contractor, there were
3 actually two other plants, the North Anna plants were
4 also involved which are not ICE condenser plants, so
5 it just happened to be a coincidence if the ones that
6 were resolved, had returned, actually are ICE
7 condensers and consistent with the comment the fact
8 that ICE condensers had no bearing on the selection
9 per se.

10 The last thing I would like to comment on
11 is what the gentleman said, it seems aggressive and
12 indeed it is, but rightly so. This is something that
13 the National Academy of Sciences has dictated to be a
14 clear national, clear and present danger, both to the
15 United States and for the world. There are large
16 amounts of inventories in the United States and Russia
17 to get rid of. Nobody has really advocated or
18 suggested the U.S. materials are in any way, shape or
19 form going to be unsecure. However, people don't make
20 that same comment about the Russians and the way to
21 get the Russians to make their moves, to make their
22 stuff secure so it's not available for theft or
23 diversion, to give it to us first.

24 MR. POWERS: Let me ask you a question in
25 that regard. We have a cooperative agreement with the

1 Russians dealing with space stations and what not and
2 they have been consistently tardy in their
3 contributions on things. Will Russians be similarly
4 tardy in this?

5 MR. RHODES: Well, if you're relying on
6 the Russians to pay for it I think absolutely the
7 answer is yes, but the agreement that was signed in
8 September required the United States in concert with
9 the G-8 nations to secure funding and financing for
10 the Russians to do the activities.

11 The biggest problem for the Russians in
12 meeting their obligations under many nuclear
13 activities around the world really has been a lack of
14 resources. They're basically a bankrupt country when
15 it comes to finding funds for major activities. So in
16 this case, the Western nations are going to fund the
17 lion's share and perhaps all of the Russian activity.

18 VICE CHAIRMAN BONACA: I wasn't here
19 during the presentation, so I apologize for that, but
20 I had a question regarding in reviewing somewhat the
21 Standard Review Plan, there is an establishment of
22 quantitative guidelines for use with acceptance
23 criteria based on the highly unlikely and highly
24 likely frequency of events, etcetera. It is not a
25 probabilistic approach to this establishment, is it?

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1 Or is it just the traditional approach that is being
2 used?

3 MR. JOHNSON: Well, the approach that will
4 be used will be consistent with the regulations in the
5 revised Part 70 and I mean we haven't gotten the
6 submittal yet, so I can't really say in detail how all
7 of that is going to be resolved, but the requirements
8 would be for the applicant to describe how they meet
9 the highly unlikely and likely scenarios in their
10 integrated safety assessment.

11 VICE CHAIRMAN BONACA: It seems more of a
12 standard approach.

13 MR. JOHNSON: Now we anticipate that
14 they're going to be using kind of a combination
15 qualitative and quantitative approach for this, so it
16 will -- it looks like it will involve both aspects.

17 VICE CHAIRMAN BONACA: Thank you.

18 MR. POWERS: You are allowed under the
19 Commission's policies to ask explicitly for risk
20 information. Are you going to do that?

21 MR. JOHNSON: I think we can ask for
22 information that we need to review the application
23 under the regulations. And I guess if that means
24 asking for specific risk information, I think it's
25 legitimate in asking that and requesting that.

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1 MR. POWERS: But you don't have any plans
2 to do so right now?

3 MR. JOHNSON: I think it will be dependent
4 on when we see the application and what is in there.
5 I think it's a little premature to say exactly what it
6 is we're going to be asking for at this point.

7 MR. KRESS: I think you'll find that the
8 ISA process is a qualitative risk information.

9 MR. POWERS: And many of us feel that
10 qualitative risk information is an oxymoron.

11 (Laughter.)

12 MR. KRESS: Right. Let's go a little
13 further, it's semi-quantitative --

14 CHAIRMAN APOSTOLAKIS: Semi-oxymoron?

15 (Laughter.)

16 MR. KRESS: Semi-oxymoron.

17 MR. POWERS: I think Stan Kaplan had a
18 statement on that. If you're having trouble
19 quantifying things, go figure out a way to quantify
20 it.

21 VICE CHAIRMAN BONACA: But the guidelines
22 are quantitative. That's what it says here.

23 MR. LEITCH: At what point in time will
24 they be submitting the ISA?

25 MR. JOHNSON: Will they be submitting

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1 that?

2 MR. LEITCH: The ISA.

3 MR. JOHNSON: The complete ISA will be
4 submitted with the operating license application. The
5 construction authorization does require a safety
6 analysis of the design bases, so there will be kind of
7 a partial, but not the finished product ISA. The
8 construction authorization will include a safety
9 analysis, will look at some of the ISA matters, but
10 the full, complete ISA will be submitted at the time
11 of the operating license application.

12 MR. SIEBER: Are there any other further
13 questions from the Members or comments?

14 If not, thank you very much for your
15 presentation.

16 Mr. Chairman?

17 CHAIRMAN APOSTOLAKIS: Thank you, Jack.
18 Thank you very much again. We will recess until 12:45
19 where we have the reception in the room there, but
20 several of us will be interviewing candidates.

21 (Whereupon, at 11:23 p.m., the meeting was
22 recessed, to reconvene at 12:45 p.m., Friday, February
23 2, 2001.)

24

25

A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

(12:50 p.m.)

1
2
3 CHAIRMAN APOSTOLAKIS: It's a great
4 pleasure to welcome the Chairman of the Commission,
5 Dr. Meserve who is here to tell us what is happening
6 up there and what his priorities are, so maybe we can
7 adjust our priorities. So without much ado, I will
8 turn it to you, Mr. Chairman.

9 CHAIRMAN MESERVE: Thank you, George.
10 Actually, I arrived here with a little trepidation.
11 Usually, the circumstances are different. There are
12 five of us on the other side of the table and we get
13 the chance to ask all the questions and I could
14 realize that this is an opportunity to turn the tables
15 on me.

16 (Laughter.)

17 George had asked if I would come in, as
18 he's indicated, and give you some sense of my feelings
19 for the priorities of the Commission over the coming
20 year and I'm going to do that, although let me start
21 out by saying that what I said a few minutes ago in
22 connection with an event for Bob Seale is that we do
23 extraordinarily value your input. It's very, very
24 important to us in the process.

25 And in that context, we want you to give

1 us your best advice. Call them the way you see them.
2 Don't worry about the consequences of it. Your job
3 is to give us the best advice and we'll have to deal
4 with it. I recognize that on occasion that may mean
5 you're passing us a few hot potatoes, but that's
6 exactly what you're supposed to do and I am never
7 going to criticize you and I don't think my colleagues
8 are for giving us a straight shot on the issues that
9 you deal with.

10 As I go through a couple of the issues
11 that I see as ones that are important to the
12 Commission over the coming year and I would like to --
13 I will leave plenty of time for questions. I think
14 most of the things I'm going to mention are going to
15 be things with which all of you are fully aware and
16 are not going to be a surprise. I will try to give
17 you my sense of the context in which I think the
18 Commission is going to be dealing with some of these
19 issues in the hope that that might be of some interest
20 to you.

21 First, I mention license renewal. This is
22 a very high visibility issue for the Commission. As
23 you know, we all had some challenges that were being
24 presented to us by the Congress, a number of years
25 ago, and we had pledged that we were going to make

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1 decisions with regards to these license renewal issues
2 within a designated time period. That doesn't
3 obviously preclude us from saying no to some. We may
4 find that to be necessary. But we are trying to abide
5 by the time lines for this in that people are
6 monitoring whether we are able to do the job within
7 the time that we've allowed ourselves.

8 I am concerned that that is going to be a
9 challenge for the Commission, particularly as the
10 queue of plants gets longer and larger. There is hope
11 in anticipation in NRR that efficiencies are going to
12 arise out of that process and the generic lessons
13 learned is obviously an effort to try to find a way to
14 take some issues off the table if that's possible, to
15 do that.

16 We'll see if that has been effective. As
17 all of you know, we've heard from, on some of that
18 that report may not be as effective in achieving that
19 goal as we might have hoped. We'll see.

20 It is essential in that process obviously
21 to look at the aging issues that we get strong,
22 reliable, technical input on matters there. I know
23 that you are involved in that. There's going to be a
24 continuing challenge for you as well as for us because
25 of the fact that as the queue gets longer, and the

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1 number of applications in our process get larger,
2 that's going to increase the burden on you. I hope
3 that it gets something that is more routinized as time
4 goes on and that it will facilitate that, but I am
5 conscious of the challenge that we're presenting to
6 you. And this is an important area for us, not only
7 because of the importance of doing the job, but also
8 because we're being assessed in terms, at least the
9 timeliness of our action in that area.

10 The second area I'd mentioned and I know
11 this is one that is an area within which this group
12 has been very helpful in its briefing to the
13 Commission and that is our efforts to risk-inform our
14 regulatory system. It is apparent to all of us that
15 we are feeling our way into that process and it is
16 proving, perhaps, to be a more intricate and
17 challenging task than some might have expected. You
18 might have had the wisdom to see what we were getting
19 into.

20 I'm not sure that all of us on the
21 Commission side of the table had an awareness of that,
22 but we clearly have a serious technical challenge in
23 order to think through our regulatory system,
24 particularly where the regulatory system is so
25 interconnected and to be able to make a change in one

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1 area without having implications you haven't thought
2 through, at least, in another area in making sure that
3 you can do this in a sensible fashion. At one point
4 I think we had talked with this group about whether a
5 clean sheet of paper might be an alternative approach.
6 The problem is that would be such an immense task,
7 we'd be many, many years until we could make progress
8 on it. So I think that the incremental approach that
9 we're taking is the right one and we're learning as we
10 go through it.

11 But it's hard for me to tell at this
12 juncture how fast the pace is going to be, but this is
13 also a high visibility issue and it does seem to me it
14 is one that is very important for the Commission
15 because it provides us with a principled way to think
16 through our regulations and decide which ones can be
17 reduced for purposes of efficiency, give us confidence
18 that what we have is either adequate or needs to be
19 supplemented and there is the prospect here for sort
20 of a win-win situation for modifying the regulatory
21 system in a way that gives us improved confidence that
22 we're achieving our objective of protecting public
23 health and safety while simultaneously perhaps in some
24 areas, reducing the burden of licensees where it's
25 needless to have that burden.

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1 And it gives us a principled way in which
2 to go through that analysis. Of course, we have had
3 the benefit of 25 years of work since the WASH 1400
4 and probabilistic risk assessment. We've always been
5 using it in some fashion in our efforts, but this is
6 a more systematic way to include it. And we should do
7 it. The learning is ripe enough to allow us to take
8 that step.

9 We're clearly going to encounter some
10 problems along the way. We have one that we have to
11 work through now with the fire protection standard,
12 for example, where we're headed off in a direction on
13 that with a standard in which it appears from the
14 letter we've received the Nuclear Energy Institute
15 that there may be no takers on our efforts to take a
16 different approach.

17 So that there are going to be those sorts
18 of pitfalls that we're going to encounter along the
19 way and we're going to have to work our way through
20 them. Again, this is an area where the insights that
21 this group can bring to bear and has brought to bear
22 in the past is going to be very important for the
23 Commission in trying to help us work our way through
24 the challenges that this effort provides.

25 This is going to be a continuing challenge

1 because I'm sure that this is going to be a decade or
2 more of work for the Commission as it does its job.
3 I say in the anticipation of at least the early
4 efforts are ones that we're going to view as
5 successful and therefore we should continue. But if
6 that's the case, then this is something that's going
7 to be a continuing challenge for us and one that --
8 which your help is going to be essential.

9 The third area I'd mention is the
10 challenges that we confront in reactor operations.
11 And there are many. We have issues with the steam
12 generators. I know that there's a report that you
13 have on that issue that at least I understand it's
14 headed toward EDO.

15 We have the revised reactor oversight
16 program and our evaluation of that and the development
17 of improved performance indicators. We have the spent
18 fuel risk study which is intended to provide a
19 foundation for rethinking recommissioning regulations.
20 We're going to have to grapple with that. We have a
21 whole series of things that relate to the interest of
22 operating plants to go to higher burn ups on fuel,
23 power-up rates and things of that nature.

24 We confront some near term challenges on
25 those and let me say that I think that the pressure on

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1 us in many of these areas is going to increase and I
2 say that because I think that the political fall out
3 from the California situation is going to be one where
4 there is going to be great interest in assuring that
5 existing plants are in a position to contribute and
6 there will be great interest in power-up rates and
7 improvements in longer burnup capacity and so forth as
8 a result of that.

9 And so I would anticipate that this is
10 going to be an area in which there will be, if
11 anything, increased interest by the licensees. The
12 economic interest was already there, but there will be
13 increased interest as a matter of energy policy of
14 making sure that we can squeeze as much power from
15 existing power plants as we can in a safe fashion.

16 And so there is going to be, this is going
17 to be an area where I would expect there is going to
18 be a variety of influences on us to be looking at this
19 very carefully.

20 Obviously, none of us want to go beyond
21 any point at which we're comfortable with adequate
22 protection of public health and safety and we will not
23 do that, but we're going to have to look at the issue
24 very carefully and I anticipate some changes there.
25 And if anything, that's something that I think the

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1 emerging situation in California may result in some
2 heightened interest in that area that may have some
3 spinoff effects for you, as well as for us.

4 The related issue as I go into the
5 political context, is something that I think would
6 have been unthinkable for anyone to mention a year ago
7 and that is the prospect that we may have some new
8 construction in the United States. We have had -- the
9 Commission has been visited by representatives of
10 PECO.

11 There was a meeting the other day that
12 Research held on the PBMR reactor and obviously
13 there's interest in that. It was a prospect that if
14 events go in South Africa as the utility hopes that
15 this may be something that will be advanced in the
16 United States. There obviously is interest in light
17 water reactors and upgrades in those of various types
18 that might also be pursued. And so I think that this
19 is something that would have been, I say, unthinkable
20 a year ago.

21 Nobody was talking about the prospect that
22 we might have new construction in the United States a
23 year ago and it's now being looked at seriously by
24 people who are thinking about the prospect they might
25 put some money in this. This, too, I would imagine

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1 and would expect is going to be affected by the
2 California situation and that there will be no doubt
3 there's interest in the Congress and in an energy
4 policy that will encompass a large number of areas.

5 Nuclear, I would expect, if I don't know
6 any more than any of you on this, Nuclear is likely to
7 be a component in that and exactly what shape this
8 takes is of course uncertain, but one would expect
9 that there will be interest in the prospect of a
10 portfolio of energy technology and that may well
11 include nuclear interest, encouraging and creating an
12 environment where to exploit nuclear when and if it's
13 appropriate to do so.

14 I think that that is perhaps a longer term
15 issue for us, but it is something that obviously, ACRS
16 is going to have to be in the middle of.

17 We have made an offer to participate in
18 some fashion in the events in South Africa. We did
19 that originally with the idea that we would -- the
20 intention as we understood it was the South Africans
21 were trying to use the risk-informed approach to
22 thinking about this reactor. We thought that we would
23 gain from involvement in that exercise.

24 Perhaps at the initial stages we didn't'
25 realize that it might truly ripen into something that

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1 might come home to the United States, but it's
2 premature to say that. But we are, at the staff
3 level, are going to be basically intensifying our
4 efforts on PBMR and alternative concepts with the need
5 to prepare today for the possibility that we may have
6 to be dealing with issues in the future and that will
7 include, of course, not only the technical side, but
8 also making sure that we have the regulatory apparatus
9 in place so we don't place needless impediments on new
10 ideas, but are able to regulate them in an efficient
11 and effective way and provide adequate assurance of
12 safety.

13 I'll just mention two other areas and then
14 throw this open to questions. One of the other areas
15 is research. When I came to the Agency, now about 15
16 months ago, one of the data points that I checked on
17 before I came here was to look at the research
18 situation at the NRC, at least in an aggregate form.
19 And I was concerned to see a program that had fallen
20 from a level of about \$200 million in the 1980s down
21 to something that's about \$40 million today.

22 Even to deal with the existing fleet of
23 reactors and dealing with issues, embrittlement
24 materials issues and embrittlement type issues, higher
25 burnups, MOX fuel, it was clear to me there were a lot

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1 of areas in which we were necessarily going to have to
2 tread in which we would need a technical foundation
3 for it being able to make decisions and I was
4 concerned about that.

5 We have two groups that are looking at
6 research. Ken Rogers is leading a group of outside
7 experts that has been examining the research
8 enterprise and I know that you have a report that is
9 headed in our direction this spring that is also going
10 to be directed at the research enterprise.

11 And let me say for my part in it I think
12 for the remainder of the Commission, I can say that we
13 are going to look at those reports very carefully and
14 to make some decisions as to what changes we should
15 make in that area, so let me suggest that that's an
16 area where -- I am thinking outside the box by this
17 group and by Ken Rogers' group is going to be very
18 welcome in that we are going to take that very
19 seriously and I anticipate that we will be holding a
20 Commission meeting that will be focused on the
21 research after we receive these two reports for the
22 purpose of our making, perhaps, making some decisions
23 for change in that area.

24 This is obviously of a different, sort of
25 broad public salience than the other issues I've

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1 mentioned, but I think it's an underpinning for a lot
2 of our long-term success is our making sure that we
3 have the capacity to be able to answer the questions
4 that we're confronting today and even more importantly
5 that we have a research foundation to be able to look
6 at the issues that are over the horizon for us today.

7 I had been worried in our research
8 program, for understandable reasons, that over time
9 we've gotten increased emphasis on being a -- doing
10 confirmative research, what we call lit internally here
11 which is basically being available to answer questions
12 as they're presented from NMSS or from NRR, rather
13 than the harder job of looking over the horizon and
14 seeing what's coming.

15 Having that capacity to do what they call
16 anticipatory research is an essential thing for us,
17 just because of the long lead time to be able to get
18 results in the research area. You need to have some
19 capacities to be able to ask the questions before the
20 people who are doing licensing decisions ask them, so
21 that you have some information in place that can guide
22 the decision process.

23 Your insights about this program are going
24 to be very important to us and I think that is,
25 summing it, is essential for the long term of the

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1 Agency.

2 The final thing I will just mention
3 quickly and it's of a different nature than us is that
4 we have -- anticipate that we will be getting an
5 application for mixed oxide fuel fabrication facility.
6 I read in the Energy Daily that that may have some
7 environmental issues associated with it that are
8 different from those that we had, I guess, understood
9 were going to be the case and it's a lot more liquid
10 waste that we may have to deal with in that facility.

11 We are obviously, the purpose of that is
12 so that we can take surplus plutonium from weapons
13 and then turn it into mixed oxide fuel and then burn
14 that in some reactor so there is the counterpart issue
15 of using mixed oxide fuel in some reactors which
16 obviously is going to raise some technical questions.

17 We've been getting mail on that issue and
18 that is another area in which I anticipate that this
19 group is going to have to be providing us with some
20 insights and again it will be welcomed to us because
21 that's moving us into some territory and it's a little
22 different in the things that we've been regulating in
23 the past.

24 With that, I'll close. Again, I would
25 very much welcome your questions and let me say again

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1 how much I appreciate your work.

2 CHAIRMAN APOSTOLAKIS: Thank you, Mr.
3 Chairman.

4 Do Members have any questions?

5 MR. POWERS: I have a couple of things i
6 would like to bring up. We are moving in the
7 direction of risk-informed regulation and this group,
8 of course, is enthusiastic about that. But I will
9 comment that one of the things that surprises us about
10 risk-informed regulation is how far we've been able to
11 get with so little risk information into the process.

12 One of the areas you mentioned was fire
13 protection and I'll remind you that I don't think you
14 were a Member of the Commission at the time, that when
15 we first looked at the performance-based ideas that
16 NFPA was advancing on fire protection, that we said
17 this is not meeting the NRC's needs and they really
18 need to start thinking about how to make fire
19 protection risk-informed as well. And I think it's
20 possible to do that because of the structure of the
21 regulations are well built for fire protection.

22 Another area that this continues to
23 interest this Committee is the area of risk during
24 operations other than normal operations. And
25 particular risk during shutdown operations. Our own

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1 feeling is that if one is really going to look at this
2 risk informing the regulations in a unit by unit basis
3 because of the tendrils of any given regulation into
4 other regulations, you're going to need a
5 comprehensive risk assessment. And one can't help
6 wondering if it isn't useful to at least have a couple
7 of people sitting down and thinking what does it take
8 to do a clean sheet of paper approach while you're
9 carrying on this more incremental approach?

10 CHAIRMAN MESERVE: You may be right that
11 as to the -- doing something in parallel, there may be
12 insights that come from one that bear in the other
13 that could be useful. I think that this has been an
14 area in which we have been resource constrained and
15 therefore have, as much as anything, I think have
16 taken a path in order to not be duplicating effort and
17 maybe that's a wrong strategy. I'll raise it.

18 I am very much aware that all of you as I
19 think as all of our staff has got concerns about
20 making sure if we go forward on risk-informed
21 regulatory approach that we have PRAs on which we can
22 rely for doing that work. And you know, there has
23 been this effort in developing the ANSI standard for
24 PRAs, the NS has got its work underway and I think
25 that all of that is something -- it's unfortunate it's

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1 been moving so slowly, but it is the -- it obviously
2 has to underlay what we're doing in this area.

3 You do mention the -- you did mention the
4 fact that we ought to be concerned about the risk at
5 all stages of operation and we have, as I think you
6 know that is particularly in the low power and
7 shutdown risk that that is an area that I share your
8 views, that this is something that perhaps we ought to
9 be looking at more seriously than we have in the past.

10 MR. POWERS: If I can just continue one
11 other step and then ask a little more controversial
12 question, but I'd appreciate, maybe you've got some
13 insights that I don't have.

14 You have spoken about the California
15 situation and it may be a renewed interest in the
16 potentialities that nuclear power offers for the
17 country and its energy mix and even spoken of the
18 potential of using commercial nuclear plants to aid us
19 in ridding ourselves of excess plutonium beyond any
20 logical defense needs.

21 Do you have any sense that there's any
22 interest in reprocessing fuel?

23 CHAIRMAN MESERVE: I'm not aware of any
24 one prepared to enter that debate. Right now we have
25 a narrowly focused effort on this MOX facility that is

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1 to deal with the plutonium that you would like to be
2 able to put in a state where it doesn't present a risk
3 for generations. And that that is the objective.

4 I don't think that there is anyone who is
5 seriously considering the reprocessing option now and
6 of course that's largely driven, I think, at the
7 moment because uranium fuel is so inexpensive and
8 there seems to be such an abundant supply and an
9 overcapacity internationally, at least, in terms of
10 enrichment capacity, that the situation is one that it
11 would be economic reasons alone you'd have lots of --
12 you don't have any pressures to be thinking about
13 going to a plutonium fuel cycle.

14 MR. POWERS: Whereas, as you said, we have
15 an abundance of supply of the input to the process,
16 we're rapidly running out of supply of things to
17 handle the output of the process and that is a major
18 headache that you have ahead of yourself.

19 CHAIRMAN MESERVE: That's true. I mean
20 that's a much different fibrillated problem by dealing
21 with the back end of the process. And we're in a
22 situation where we await decisions that get made with
23 regard to Yucca Mountain on that.

24 CHAIRMAN APOSTOLAKIS: Any other comments,
25 questions?

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1 MR. POWERS: I'd also like to kick in a
2 couple of other comments, least there be any -- maybe
3 we need to realign our wheels. You spoke of the
4 research report. We are preparing a research report
5 in which we did not plan to speak at all to the issue
6 of the way RES is organized. We would speak in this
7 report to the technical content of the work of
8 research and perhaps some of its relationship to the
9 line organizations, but not to anything about the
10 organization and feeling that if there were things to
11 be said in that regard, it might be better for the
12 Rogers committee to speak to that issue than
13 ourselves. We have addressed the issue in the past
14 and didn't plan to in this report. If you want us to
15 do something different, speak now or forever hold your
16 peace.

17 (Laughter.)

18 CHAIRMAN MESERVE: Let me say that I would
19 welcome this group, giving us advice, broadly as it
20 chooses on the research area. If whatever reason you
21 conclude that there are certain areas that you don't
22 want to intrude upon, be covered elsewhere or that for
23 whatever reason you think that might delay the report
24 significantly to get into other areas, I will
25 understand that.

1 We do have the benefit of the Rogers
2 effort and so we're going to have no doubt some
3 overlap and presumably some areas of nonoverlap
4 between the two reports. So I am not asking you to
5 redirect your report, but let me just say and repeat
6 again what I had said earlier is that we are prepared
7 to receive your recommendations in the research area
8 wherever you choose to provide them and if you have
9 views in areas relating to organization that you would
10 like to provide us, then that's fair game. But I'm
11 not asking you to redirect your effort.

12 MR. POWERS: Okay. We are trying to
13 coordinate loosely with the Rogers committee in the
14 sense of community with them over what they're doing
15 and what we're doing and I think I can say with some
16 confidence that the overlap is minimum.

17 MR. POWERS: Okay.

18 MR. SEALE: I think it's also true that
19 there's not anything in those earlier research reports
20 that we would disavow at this point.

21 MR. POWERS: Not a thing.

22 MR. SEALE: So to the extent that it's not
23 addressed in this report, if you go back and find it
24 in an earlier version, it's pretty much on mark as far
25 as we're concerned.

1 CHAIRMAN MESERVE: You might want to say
2 that in your report.

3 CHAIRMAN APOSTOLAKIS: Any other comments,
4 questions?

5 MR. LEITCH: Chairman, it's a little off
6 the topic, perhaps, but one of the things that
7 concerns in the broad sense is the aging of the people
8 in this industry and the technical skills that seem to
9 be leaving, perhaps by retirement. Maybe it's Dr.
10 Seale's retirement party that makes me think about
11 these issues, but do you sense any difficulty in
12 attracting the brightest and best people into this
13 industry today?

14 CHAIRMAN MESERVE: I think this is, I
15 didn't mention this as one of the issues to mention to
16 you, but as an Agency, this is clearly a very serious
17 issue for us. We have six times as many people over
18 60 in this Agency as we have people under 30. You can
19 -- you go to some important parts of the organization,
20 Research, NRR, there's an order of a quarter of the
21 people who are fully eligible for retirement, could
22 leave today, full retirement. And those numbers, of
23 course, are growing as time goes on.

24 This is, in part, the consequence of the
25 fact that our budget has been going down and

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1 allocation of full-time equivalents has gone down.
2 Until the last year, we managed to get real growth in
3 both, very slight real growth in both. And we managed
4 that through attrition in that we have not had the
5 opportunity to bring in as much as fresh blood as we
6 would like to in terms of being able to strengthen our
7 capacity.

8 I have talked to people in the industry
9 and of course, they are confronting exactly the same
10 problem and that we're drawing from the same pool of
11 people. The data I've seen is that we're producing,
12 this was nuclear engineers alone, I've realized we
13 draw from broader communities, but the national
14 production of nuclear engineers -- if I have the
15 figures right, is in the order of about 240 a year and
16 the jobs from the industry are in the order of 600.
17 So that's without considering our demand. So we
18 confront a very serious challenge, both at the NRC and
19 the nuclear energy industry more broadly. It's a
20 pipeline problem.

21 I think that time may correct that in some
22 sense there's always a lag time is the problem in that
23 there are economic signals that are going out that
24 weren't there a year ago that if you go into this
25 field there are going to be jobs. And there's a

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1 future with life extension of plants, as a possibility
2 you can go to work for a given utility and you may
3 have a career, rather than a plant that's going to be
4 terminated early.

5 So I mean the context is different, but
6 it's going to take a while until that builds into the
7 system. To try to deal with our problem, I have asked
8 for the EDO to provide basically a plan of attack for
9 us on this issue which has just arrived on my desk.
10 And it's going to start with trying to assess the
11 areas in which we have a perceived need, have
12 competency over the years and seeing where we are in
13 each of those and how we backfill and try to generate
14 a plan for being able to deal with that.

15 I am hopeful that we may be a beneficiary
16 of the fact that as a country we're going to start
17 looking seriously at energy issues again and that
18 there will be concern about this issue at the
19 political level that may make it possible for us and
20 other agencies to be able to address serious manpower
21 issues that we, as a society as a whole confronts in
22 this area.

23 I hope that's the case, but we're clearly
24 going to have a short term problem at the least.

25 MR. SHACK: Just in the context of our

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1 research report, one of the issues that always arises
2 as we go through this is when does the NRC need to do
3 the work and when do we accept the data from industry?
4 Our plants are basically built and licensed on designs
5 and data from industry, but you mentioned, for
6 example, embrittlement of pressure vessels. If a
7 utility wants relief so it can go through a different
8 pressure temperature start up or use a master curve
9 approach, are you comfortable with them supplying the
10 data? Do you feel that there's a need for the NRC to
11 independently assess these issues? Do you have any
12 feeling for when we ask for independent verification
13 and when we don't, because it's always an issue in the
14 research area.

15 CHAIRMAN MESERVE: I can't give you an
16 informed view of that matter. It is clear that sort
17 of fundamental things that are essential for safety,
18 we need to have some independent capacity to be able
19 to judge, things that are longer termed efforts, more
20 generic than cooperative ventures with industry, for
21 example, would be something we ought to encourage
22 maybe more than we have in the past as it gets down to
23 more specific licensing issue than perhaps a little
24 more distance capacity to be able to look very
25 carefully and be able to confirm that information is

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1 necessary.

2 I agree, it's a very tricky issue in it's
3 not one that I can -- I feel capable to provide very
4 much light to illuminate it for you. I think that --
5 I suspect that this is an area where you're going to
6 have -- I hope you will have some insights for us in
7 your report.

8 How's that for turning the table?

9 (Laughter.)

10 I'm sure we wouldn't let you get away with
11 that.

12 (Laughter.)

13 To answer this real quickly, no, we don't
14 need any more data on pressure vessel integrity.

15 (Laughter.)

16 CHAIRMAN APOSTOLAKIS: Robert Uhrig.

17 MR. UHRIG: You alluded a few minutes ago
18 to anticipatory research and yet we are getting the
19 signal, both directly through speeches and indirectly
20 by word of mouth that other Commissioners have a less
21 liberal view on this, specifically saying each
22 research project should have a very defined end
23 product, this type of thing. I wonder if you could
24 address this a little bit.

25 CHAIRMAN MESERVE: Well, let me say that

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1 the background for all of our activities and the
2 thought process we have to follow is that for the most
3 part our budget is one that is paid by our licensees
4 and that puts pressure on us to make sure that above
5 and beyond the pressure that every Agency feels to be
6 efficient and effective in the expenditure of funds
7 and the danger is that the more the research is
8 anticipatory, the more vulnerable it is to being seen
9 as not being related to a real industry need. That
10 may not prove to be the case, of course.

11 The whole reason you're doing anticipatory
12 research is because you believe it's going to be an
13 important need that the Agency is going to have to
14 confront to deal with things that our licensees
15 present to us in the future, but the reason it's not
16 a present demand from NRR and NMSS is because it's not
17 one that's being currently presented to them. So
18 there is a vulnerability to the fact that why in the
19 world is the NRC involved in that area? We don't have
20 any requests to you in that area.

21 I think that this is an issue which I
22 talked to my colleagues about and I think that -- I
23 think there is a recognition of the need for
24 anticipatory research. There may be varying degrees
25 of enthusiasm for how far you get into it, depending

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1 on the fiscal situation and let me say that this is an
2 area that one possible solution might be to try to get
3 at least some of the research that's funded out of
4 general revenues, rather than from fees. And I can't
5 speculate as to whether that's like, but that is one
6 way out of the impasse.

7 MR. UHRIG: Another related issue, we have
8 heated debates at times about who should do the
9 research. There's an argument that the utilities
10 benefit from it, they should do the work themselves
11 versus this is something that's important to the NRC,
12 therefore NRC should support it and then there's the
13 middle ground in between that's -- sometimes it gets
14 lost because nobody picks it up.

15 CHAIRMAN MESERVE: I think this relates to
16 the matter we were just talking about a moment ago
17 about the degree to which the NRC can rely on on
18 industry data that's very into that is who should be
19 the performer of the research. And I think it has a
20 lot to do with the extent to which the data is
21 critical to an individual license application and
22 obviously we need to have -- that's a cost that should
23 be born by the licensee initially.

24 We need to have a capacity to be able to
25 verify its accuracy and have to have a sufficient

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1 knowledge of the field and of the data to be able to
2 do that, as opposed to something that's a much more
3 generic issue in which there is, that maybe no one was
4 prepared to pick it up. It's sort of a commons issue
5 in which there may be a -- might be appropriate for
6 the NRC, recognizing that the work has to be done to
7 play a role.

8 I don't -- there's a separable question
9 there as to who the performer is. They decide that
10 the NRC should support it, but then there's the
11 question of where the work should be done. I think
12 that with a wide variety of possible sources and
13 obviously, to my mind that depends very much on where
14 we can get the work done most effectively and the most
15 reliably. We should obviously use international
16 efforts to the extent we can. I believe, just because
17 of the cost savings that we can and they have
18 facilities abroad that we may not be able to replicate
19 here. So it's a complicated set of parameters you
20 need to consider in making a decision.

21 CHAIRMAN APOSTOLAKIS: I have a couple of
22 comments, too. We discussed earlier the issue of PRA
23 quality and the need to do PRAs for modes of operation
24 other than power. I think another related subject
25 that perhaps has not attracted as much attention is

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1 the use of codes and tools that have been developed by
2 various industrial groups, consulting firms which are
3 being used and the agency really hasn't to my
4 knowledge reviewed them or used them in some way to do
5 make sure that what they do is reasonable.

6 The measure seems to be that if this code
7 is used by a lot of people it must be good and I think
8 it's important to have some mechanism to make sure
9 that what these codes produce is reasonable.

10 Now to go all the way and say that these
11 codes, the PRA codes should be blessed by the NRC the
12 way thermohydraulics codes have been in the past,
13 maybe that's not the answer either because then to
14 change something is a major headache, but I think we
15 need to find a way and of course, most of these are
16 proprietary, you really have to buy them to --
17 although some companies are willing to give them to you
18 for free, but even then it takes some effort and
19 resources to run them and find problems.

20 I think that tools that we as an industry,
21 as a community are using to assess risks have to be
22 subjected to some scrutiny so that as a community we
23 will feel that yes, this particular computer program
24 produced something reasonable that can be used under
25 certain conditions. And right now we don't do that.

1 We just rely on reputation and number of users and so
2 on, so I think that's an important consideration and
3 the committee, I think, will say something about it,
4 at least in the research report and maybe in other
5 forms as just information.

6 CHAIRMAN MESERVE: George, on that point,
7 are there some specific areas for codes that you're
8 talking about? Obviously, we heard from you on the
9 thermohydraulic codes.

10 CHAIRMAN APOSTOLAKIS: Yes.

11 CHAIRMAN MESERVE: He have effort
12 development in PRAs.

13 CHAIRMAN APOSTOLAKIS: I think they do a
14 lousy job calculating importance measures and this is
15 the central part of option 2. And the utilities are
16 caught in the middle. They go out, they buy one of
17 the best according to reputation and so on and now
18 here comes the ACRS and says no, you have problems
19 with the code and they have invested a lot of
20 resources doing various things that are required by
21 the regulations and I think somehow we have to avoid
22 that in the future and make sure that the tools that
23 are out there are doing what they're claiming they're
24 doing.

25 CHAIRMAN MESERVE: You have something

1 coming to us in this area?

2 CHAIRMAN APOSTOLAKIS: If I convince my
3 colleagues at some point.

4 (Laughter.)

5 MR. POWERS: George, we may go on from
6 this to even build upon this, not only do we have
7 these peculiar importance measures that are somewhat
8 historic in their generation, we have alternatives
9 proposed by licensees that no one seems to take
10 seriously.

11 CHAIRMAN APOSTOLAKIS: That's correct.

12 MR. POWERS: And we have academic papers
13 which seem to make a fairly logical expansion type
14 argument that seem to get ignored. It's a real
15 problem here when we have set down in writing what the
16 division --

17 CHAIRMAN APOSTOLAKIS: You are putting me
18 in a situation of conflict of interest.

19 (Laughter.)

20 MR. POWERS: I happened to have read the
21 paper and liked it.

22 CHAIRMAN APOSTOLAKIS: Mr. Chairman, I had
23 another thing to say and I must have forgot it.

24 (Laughter.)

25 Any other comments from my colleagues?

1 CHAIRMAN MESERVE: Thank you very much.
2 I appreciated the opportunity to meet with you and let
3 me say that as issues arise that you'd like to talk to
4 me about, I am available to you. Please call and I've
5 sent -- George, in particular, please stop by and let
6 me know what's going on.

7 CHAIRMAN APOSTOLAKIS: I'd like to finish
8 by repeating something I told you the other day, that
9 this committee does know what an engineering approach
10 measure is. Don't believe it when people tell you we
11 don't. We really appreciate your willingness to come
12 here and spend some time with us. Thank you very
13 much.

14 CHAIRMAN MESERVE: My pleasure. Thank you
15 very much.

16 CHAIRMAN APOSTOLAKIS: We will recess
17 until 2:15.

18 (Off the record.)
19
20
21
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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: Advisory Committee on

Reactor Safeguards

479th Meeting

Docket Number: (not applicable)

Location: Rockville, Maryland

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.



John Mongoven
Official Reporter
Neal R. Gross & Co., Inc.

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