

NUCLEAR REGULATORY COMMISSION

ORIGINAL

Title: Advisory Committee on Reactor Safeguards
Thermal-Hydraulic Phenomena Subcommittee

Docket Number: (not applicable)

PROCESS USING ADAMS
TEMPLATE: ACRS/ACNW-005

Location: Rockville, Maryland

Date: Wednesday, February 11, 2004

Work Order No.: NRC-1302

Pages 639-661

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Closed Sessions
pages 1-475-2/10/04
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
(ACRS)

MEETING OF THE SUBCOMMITTEE ON THERMAL-HYDRAULIC
PHENOMENA

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WEDNESDAY,

FEBRUARY 11, 2004

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory
Commission, Two White Flint North, Room T2B3, 11545
Rockville Pike, at 1:00 p.m., Dr. Graham Wallis,
Chairman, presiding.

COMMITTEE MEMBERS:

GRAHAM B. WALLIS, Chairman

SANJOY BENJEREE, ACRS Consultant

RALPH CARUSO, ACRS Staff

THOMAS S. KRESS, Member

VICTOR R. RANSOM, Member

JOHN D. SIEBER, Member

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1 ACRS STAFF PRESENT:
2 RALPH ARCHITAL
3 STEVE BAJOREK
4 STEVE BLOOM
5 JOSEPH COLACCINO
6 J. GENE HSII
7 WALTON JENSEN
8 JIM LYONS
9 YURI ORECHWA
10 JOHN SEGALA
11 ED THROM
12 JENNISFER UHLE
13 LEN WARD
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P-R-O-C-E-E-D-I-N-G-S

(1:05 p.m.)

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2
3 CHAIRMAN WALLIS: Okay. We are back on
4 the record, and this session will be open. We will
5 begin with Dr. Susan Sterrett.

6 MS. STERRETT: Okay. Thank you for
7 letting me talk today about something I think is
8 important.

9 CHAIRMAN WALLIS: Are you on with the mike
10 and all that?

11 MS. STERRETT: Sorry?

12 CHAIRMAN WALLIS: You have to speak into
13 that mike.

14 MS. STERRETT: Can you hear me now?

15 CHAIRMAN WALLIS: Yes.

16 MS. STERRETT: Okay. Hello. I'm Susan G.
17 Sterrett. I'm a professor of philosophy at Duke
18 University in Durham, North Carolina. Prior to my
19 academic career, I worked on the design of nuclear
20 power plants. My comments today are just updates to
21 remarks made to ACRS committees on previous occasions.

22 First a brief review. In earlier remarks,
23 I expressed concern. There were really two issues,
24 one over whether the AP1000 integrated plant design
25 had been designed to the level of detail appropriate

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1 for the 10 CFR Part 52 process under which it's been
2 submitted for design certification.

3 As I understand it, the analyses performed
4 were supposed to reflect inasmuch as possible, final
5 design based upon verified design calculations. After
6 final design approval, the questions that can be asked
7 are very limited. So, the new 10 CFR 52 one-step
8 licensing process is meant for a plant design that's
9 at about the stage in the design process where plants
10 under the older two-step process were at when applying
11 for an operating license.

12 So, one of the things I ask is whether the
13 AP1000 design was at that stage or at a more
14 preliminary stage, that is, a stage where perhaps the
15 major components and lines of primary safety systems
16 had been sized and functional capabilities of other
17 systems specified but where not all the details
18 guaranteeing those functional capabilities were in
19 fact provided have been yet specified or verified.

20 Then in other remarks, I asked about the
21 process by which the AP600 integrated plant design was
22 operated to an integrated AP1000 plant design. There
23 are a number of questions that I think ought to be
24 asked to insure confidence in this design. One major
25 question was who's entitle to make the decision about

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1 which features, calculations, and documents for the
2 AP600 need to be reviewed for changes in upgrading to
3 the AP1000? A change control process meant to
4 evaluate how individual proposed design changes to an
5 already sort of determined plant design are evaluated
6 and implemented probably will not address the kind of
7 overarching questions that arise in such a major
8 uprating.

9 Okay, so far that's just what I asked
10 before. There's been --

11 MR. KRESS: Let me ask you a question.

12 MS. STERRETT: Sure.

13 MR. KRESS: Why do you view this as an
14 upgrade? Why not just view it as a different design?

15 MS. STERRETT: Well, yes, it's only
16 because Westinghouse called it an uprating, but I
17 think the reason that they did that, you can ask them,
18 but I believe last time when Ron Butte gave a
19 presentation to the ACRS committees, that's what he
20 said.

21 MR. KRESS: It doesn't fit the description
22 of an uprate that the staff normally uses.

23 MS. STERRETT: Yes. You know, yes, I'm
24 just trying to understand how to conceptualize it. I
25 think the reason is that they approach it as a design

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1 constraint is not to change anything unless you have
2 to, and that's very much like an uprating. So, that
3 means you inherit as much as possible whereas if you
4 were doing a new plant design, you wouldn't probably
5 have that kind of constraint. Does somebody want to
6 comment on that?

7 CHAIRMAN WALLIS: I think what we're doing
8 is we're actually treating it as a new design.

9 MS. STERRETT: Okay.

10 CHAIRMAN WALLIS: But we're learning from
11 what we learned with the AP600. So, we're not saying
12 it's an uprate, but where we learned something about
13 AP600 which is applicable, we're applying that
14 learning, but it's not as if we're treating it as an
15 uprate from something.

16 MS. STERRETT: Okay, then let's see how
17 the question would read if that's the case. How would
18 you approach a design where one of the constraints is
19 to keep as many of the documents from the AP600, as
20 much of the hardware, so you start with the AP600 as
21 a constraint and you try and make as few changes as
22 possible? I think some of these questions would still
23 arise.

24 CHAIRMAN WALLIS: Well, we've asked that
25 sort of question. They have the same accumulator

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1 size, for instance, but they have a different core
2 make-up tank size. We've asked about that, and it's
3 not as if they're locked into it. They justify why
4 this is so. They've learned from the AP600 experience
5 that the accumulator was probably oversized for that
6 purpose, but the CMT needed to be expanded. So, it
7 goes along with what I said before. They've learned
8 from AP600, but I don't think there are unreasonable
9 constraints being imposed.

10 MS. STERRETT: Right. The question that
11 I'm asking is if you do each of these changes as
12 evaluating this particular change like accumulator
13 size or number of main steam valves, number of
14 feedwater heaters and so on, if you do each one
15 separately, it seems to me you don't quite capture
16 what you need to as opposed to looking at the whole
17 thing altogether.

18 So, you may know that you need to uprate,
19 increase the accumulator size, but how do you know of
20 all of the stuff you've inherited, how do you know
21 what's impacted by those changes, the changes you have
22 made? What's the process? That's what I'm asking.

23 CHAIRMAN WALLIS: Okay, well, I think we
24 ask ourselves some of the same questions you're
25 asking.

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1 MS. STERRETT: Okay. So nothing so far is
2 new. That's all I raised before.

3 All I want to talk about today is there is
4 some activity related to this topic since that July 18
5 subcommittee meeting that I want to talk about today
6 for just a few minutes.

7 In that July 18 meeting, the NRC
8 identified as an open item a QA inspection, and when
9 I raise my question about the level of detail of the
10 design and the question of how the process of choosing
11 which documents and features from the AP600 were
12 impacted and which were not, one response to the
13 question was to refer to the QA inspections to be
14 performed at a later date.

15 The QA inspection was performed in
16 September of 2003 and the NRC inspection report made
17 publicly available in mid-November.

18 CHAIRMAN WALLIS: 2003, Right?

19 MS. STERRETT: Sorry, 2003. I don't have
20 a validator checking my notes, unfortunately. It now
21 appears that the QA inspection addressed less than I
22 realized. The questions I've raised remain unanswered
23 after it so that the update is just that I had thought
24 that this QA inspection was going to answer some of
25 the questions.

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1 Meanwhile, the date scheduled for final
2 design approval has been moved up to coincide with the
3 date the FSER is to be issued. So, I'd just like to
4 talk about a few things in that report that are
5 troubling, but to me at least, if not so apparent on
6 the surface, things that didn't result in a
7 nonconformance finding or are now considered closed
8 out open items.

9 First, the QA plan referred to as a
10 project specific quality control plan was definitively
11 identified as the AP600 quality assurance program
12 plan. It was recently made publicly available. The
13 part applying to design control I think is just a
14 single paragraph referring to unspecified written
15 procedures covering the change control process. When
16 I say unspecified, not specified in that procedure,
17 not that it's not specified somewhere else.

18 So, it doesn't appear that it was part of
19 the purpose of the QA inspection to really get into
20 the question that I was interested in that I thought
21 was important, is the kind of procedures needed to
22 insure design adequacy for the unique kind of project
23 the AP600 is. That is, the change control procedures
24 deal with give me a change, and then I'll evaluate its
25 appropriateness, what else is impacted and so on.

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1 Well, how are these things done? Is it
2 done one at a time? Is one person doing one part and
3 one person doing another? That's the question.

4 So, a procedure that was meant to handle
5 individual changes, that's what I'm asking. Is that
6 the procedure that was used for at least I consider
7 more overarching questions. Hence, the question
8 identified above about whether there was a procedure
9 and if so, which procedure it was that covered the
10 overarching process of determining which features,
11 calculations, and documents of the AP600 apply to the
12 AP1000 unchanged and which are impacted by the new
13 design, shall we say, remains.

14 The reason I focus on this is that it
15 can't be done piecemeal. Many calculations use the
16 results of other calculations, either directly by
17 using values of parameters that are computed by other
18 calculations or indirectly by involving design
19 features or values of parameters based upon other
20 design calculations. The order in which things are
21 done matters.

22 Now, of course, I'm at a disadvantage here
23 because this session is closed, so I really don't know
24 whether you know, where this figures in what you're
25 dealing with today.

1 Secondly, the report concluded that audits
2 and self assessments performed for the AP1000 have not
3 performed a comprehensive review of calculation or
4 design analysis technical validity. One issue
5 identified only as a weakness in the QA program and
6 not a nonconformance was the inadequacy of
7 Westinghouse's corrective action to an issue report
8 identifying a problem that AP1000 self assessments did
9 not get below the procedural adherence level and into
10 the technical application of the calculation.

11 Another observation made throughout the
12 report was that the audits focused on compliance with
13 quality requirements rather than a review of the
14 technical validity of the AP1000 design process.

15 CHAIRMAN WALLIS: This is, you're reading
16 from?

17 MS. STERRETT: The QA inspection report.

18 CHAIRMAN WALLIS: By the NRC?

19 MS. STERRETT: Yes. And you can see the
20 rest. The point is simply if these were ongoing
21 problems at the time it was being -- the design was
22 being developed, it's not the sort of thing -- it's
23 hard to see how actions taken now on calculation,
24 forms, procedures, and self assessments in the future
25 are going to address that influence in the past.

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1 Another observation that report was the
2 inspectors noted that the technical reviewer
3 performing the 2003 self assessment was the author of
4 one of the assessed calculations. This didn't lead to
5 a nonconformance either, but the QA report noticed
6 that the inspectors questioned if the self assessment
7 process was capable of reliably detecting technical
8 deficiencies in the design control process.

9 Then that issue was to be dealt with in an
10 open item, and the open item remarked that the scope
11 of the internal audits and self assessments focused
12 primarily on procedural adherence rather than the
13 technical validity of design analyses and
14 calculations. So, Westinghouse was asked to do what's
15 quoted in A and B there.

16 "In light of the limited scope of internal
17 audit and self assessment calculation technical
18 validity reviews, please describe any methods and
19 oversight activities utilized by Westinghouse to
20 assess the effectiveness of the AP1000 design control
21 measures, particularly those related to the technical
22 validity of design products. In your response,
23 describe any additional assessments or reviews that
24 have been performed, including the scope of these
25 reviews."

1 The portion of the open item appears to
2 have been closed out based on a response given in
3 November of 2003. The response in which the open item
4 was closed out, though, is largely the offense of a
5 particular corrective action. In other words, they
6 were cited as a failure to do something that was
7 required, and it was pointed out that actually it
8 wasn't a failure to respond to a requirement. It was
9 just a suggestion. So, that response did result in
10 the closure of that open item.

11 Now, I'm not criticizing that at all.
12 The point is just that it looked like this is a point
13 in the review where this question would be dealt with,
14 and actually the question still remains. That is, the
15 response that was given really was a defense of a
16 particular corrective action and wasn't really an
17 attempt to establish in general the adequacy of the
18 methods and oversight activities utilized by
19 Westinghouse. I'm quoting now from what the request
20 was -- to assess the effectiveness of the AP1000
21 design control measures, particularly those related to
22 the technical validity of design products, end quote.

23 So, that's why I say that many of the
24 questions I raised earlier remain unanswered in spite
25 of the close-out of this open item about the technical

1 validity of design products.

2 There's one other comment I have only
3 become recently aware of that bears a little bit on
4 the issues here. In reading the publicly available
5 documents, I see from the discussions of the
6 construction inspection document, framework document
7 for the 10 CFR 52 process, that it's not going to be
8 possible to test all the ITAACS, the inspections test
9 analysis and acceptance criteria. Rather, a
10 statistical sampling method will be employed.

11 I just mention that because several times
12 the response to my concern about the design detail in
13 the 10 CFR 52 licensing process has been met with the
14 remark that if there is a deficiency, it will show up
15 in the ITAACS. And if all the ITAACS are met, the
16 plant will perform properly from a safety point of
17 view. I've never agreed that this response is
18 appropriate, but now in addition, it appears that that
19 kind of exhaustive check and balance isn't going to
20 exist anyway.

21 My remarks today are not because I'm
22 critical of nuclear power plants in general. I'm not
23 or even of the 10 CFR 52 process per se, just that the
24 10 CFT 52 design process shouldn't be applied to a
25 plant design submittal unless it's been designed in

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1 the detail required by that process.

2 It seems to me there are questions that
3 ought to be asked to provide confidence that the plant
4 has been so designed. The recent QA inspection has
5 asked some of these questions, but I think that in
6 spite of the fact that the associated open item is
7 considered resolved, the result does not inspire
8 confidence. In fact, I think it's raised some doubts.

9 Now, how this relates to the safety basis
10 of the plant, I wasn't going to go into that because
11 I assume it's clear that numerous design aspects
12 throughout the plant impact the safety analysis in
13 various ways. I mentioned a couple of them in earlier
14 remarks. One is just classification based on
15 frequency of initiating events is one. Another is if
16 you're counting on a capacity of a major component
17 like a relief valve, of course the piping layout to
18 that is going to affect the capacity, even if you've
19 sized the valve properly, and that they do so even
20 more when a risk based approach is used in the
21 licensing process, so I won't go into that anymore, as
22 that point was met with agreement when it was made on
23 earlier occasions.

24 This concludes my formal remarks for
25 today. Thank you for listening.

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1 CHAIRMAN WALLIS: I'm trying to get some
2 of your points. I think your point is that what we
3 look at with AP1000 is the major components and how
4 they are connected in a way which does not go into the
5 detail of exactly where all the pipes would be perhaps
6 in a system or how there might be auxiliary pipes or
7 things like that and whether this pipe goes through
8 that room or near another room so there might be other
9 effects if this pipe burst, and if we don't quite know
10 where the other pipes are or the other rooms or other
11 instruments or something, we can't do a full
12 assessment of what might happen. Is it that there's
13 not enough detail in the design so that we can look at
14 all the effects? Is that really what you're getting
15 at?

16 MS. STERRETT: Well, it's close, but it's
17 a little bit more dangerous I think, and that is that
18 those details are there. There are so many of them
19 that are inherited from the AP600 that we may think we
20 know. The question is which of those were evaluated
21 for the impact? It's almost harder when you've got a
22 complete plant design you're making some changes to.

23 So, the question, I would just vary it a
24 little bit from what you've said is, have you
25 considered all the way these things would change?

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1 It's not that there's missing detail.

2 CHAIRMAN WALLIS: Let's say, suppose that
3 the steam pipe routing relative to the control room
4 were an issue. I'm not going to say it is, but
5 suppose it were. So, if something of that level of
6 detail were an issue, and suppose that the AP1000
7 steam pipe routing relative to the control room were
8 the same as in AP600 and nothing was significantly
9 different, same pressures, temperatures and
10 everything. One might say one doesn't need to revisit
11 that if it's already been decided for AP600. So,
12 there are certainly some things that carry over from
13 previous, even at some level of detail.

14 MS. STERRETT: Right. I'm just asking the
15 question about of all the things that would have to be
16 looked at, what was the process used to decide which
17 things we'll just say well, we used the same as on the
18 AP600 and which not. I mean, I think the point was
19 made again and again how many of the documents were
20 the same, how much of the layout was the same and so
21 on. That's why the question arises. Should it be so
22 much the same? How was it decided? Was it one
23 person? Was it decided by different people in
24 different places who didn't know what the others were
25 doing? Was there a committee of a bunch of select

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1 people who did know everything that was going on?
2 That's the question.

3 CHAIRMAN WALLIS: And also, the carry-over
4 from AP600 to AP1000 isn't quite as easy as you might
5 think because I think the staff members reviewing it
6 are not the same as the staff members who did the
7 AP600. There have certainly been changes on the ACRS.
8 There are people on the ACRS who weren't here when
9 AP600 was reviewed, and so they certainly have to
10 start from the beginning. It's not as if they carry
11 over too much memory from before. Of course, that
12 memory might even be useful, not harmful, but they
13 have to dig in at a level where they're satisfied when
14 they didn't necessarily know much about AP600 at all.
15 So, I don't think it's as if they're prejudiced by
16 what they learned about AP600, if that's the concern.

17 MS. STERRETT: I wasn't concerned about
18 prejudice.

19 CHAIRMAN WALLIS: This is a fresh look at
20 a system which I think we're taking on its merits.

21 MS. STERRETT: Yes. Well, the concern was
22 more that when I look at the DSER, how did arguments
23 go? A lot of times the arguments go in terms of the
24 such and such system has the capability of blankety-
25 blank, right? Now, the question about detailed design

1 is okay, well, that was a capacity. Maybe it was
2 upgraded for the AP1000. Maybe it was the same as on
3 the AP600, but the question is the analyses are using
4 sort of, a lot of times they're using a general system
5 parameter of a capacity that will be -- it being
6 provided is dependent on this kind of review where the
7 details were reviewed to see whether with the changes
8 -- it may even be that I think in the first time I
9 spoke, gave examples of how maybe the system stays
10 exactly the same, but there's some interfacing
11 pressure that's different.

12 So, that's the kind of thing that when you
13 do your analyses, I think, from looking at the DSER,
14 you will often do things like in the safety analysis,
15 I think you have to do things like well, what's the
16 maximum relieving capacity of a valve or something
17 like that, or what's the minimum, or things like that.
18 So, that's the kind of thing I'm thinking about where
19 you're just looking at a certain parameter. The
20 question that would arise is what do we have to look
21 at to guarantee that that parameter with all the
22 changes on the AP1000 is actually provided?

23 CHAIRMAN WALLIS: Do my colleagues have
24 something to add to this point? Staff or
25 Westinghouse, do you wish to say anything at this

1 point?

2 MR. SEGALA: I guess at the last ACRS
3 meeting in July, we had committed to responding to Dr.
4 Sterrett's concerns, and we still plan to do so.

5 CHAIRMAN WALLIS: So, you're going to
6 write a formal reply to Dr. Sterrett.

7 MS. STERRETT: I'm just curious. How was
8 the process done? I mean, is that a question that you
9 asked, and I mean, is there something I just haven't
10 read or something that's not publicly available? Some
11 report that said --

12 CHAIRMAN WALLIS: You're talking about the
13 QA program in particular?

14 MS. STERRETT: Well, no, I'm talking about
15 the overarching question of how these changes are
16 orchestrated. In other words, if you had somebody
17 doing this system and somebody doing this system,
18 there has to be sort of an overall view.

19 MS. UHLE: This is Jennifer Uhle from the
20 staff. I'm in the PWR section, reactor systems, and
21 I can speak for my area of review. The design review
22 has gone according to the standard review plan, which
23 is used for all licensing, both licensing actions that
24 come in for a plant that's already built and also for
25 design reviews.

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1 The way that we have approached it simply
2 is that this is a new design, and we have input decks
3 that are developed for the AP1000, and they are
4 reflective of the AP1000 as built design, and we have
5 analyzed all the Chapter 15 transients and analyses,
6 as required by the standard review plan from beginning
7 to end. So, we have analyzed the entire operation of
8 the system.

9 MS. STERRETT: Okay, yes, I understand
10 that. It was a matter of -- then the question arises
11 about what -- you're using certain system capabilities
12 in your analysis, and the point I raised earlier about
13 the design details, guaranteeing those is really where
14 the question arises.

15 MS. UHLE: So, are you questioning how the
16 vendor or the licensee who is going to operate this
17 plant, how they are assuring that they have actually
18 built the AP1000 that is consistent with the as
19 analyzed AP1000 design?

20 MS. STERRETT: Generally.

21 MS. UHLE: That goes back to the ITAAC
22 process, which is not our area, so I can't really
23 speak for the staff on that.

24 MS. STERRETT: Yes.

25 MR. KRESS: We can comment on your concern

1 about the statistical sampling in the ITAAC. The
2 staff has assured us that it will be limited to a very
3 few things that are amenable to statistical sampling.
4 That's things like there's many, many, many components
5 of that particular nature that have to be shown how a
6 particular reliability or something, or particularly
7 capacity So, you can't really investigate that many,
8 maybe something like a relay or something of that
9 nature. We use a statistical sampling on that, only
10 when it's appropriate.

11 So, you know, it would be very few things
12 that undergo that process.

13 CHAIRMAN WALLIS: So in general, they'll
14 cover the whole field, but where there are a lot of
15 common things, like relays, it might make more sense
16 to sample not all of them, and have some real
17 confidence that when they got knowledge about the
18 whole set by looking at a smaller subset?

19 MS. STERRETT: When you have sort of a
20 homogenous bunch of things.

21 CHAIRMAN WALLIS: This wouldn't apply to
22 big items. They were looked at individually.

23 MS. STERRETT: Okay, thank you for
24 listening.

25 CHAIRMAN WALLIS: Thank you very much. I

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1 really appreciate having someone outside the nuclear
2 club present questions and concerns. Thank you very
3 much.

4 Can we move on to a closed session now?
5 The staff has been waiting to present.

6 (Whereupon, at 1:30 p.m., the proceedings
7 went off the record and immediately resumed in Closed
8 Session.)

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CERTIFICATE

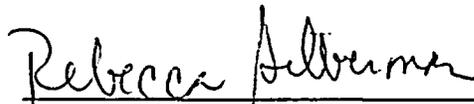
This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on
Reactor Safeguards
Thermal-Hydraulic Phenomena
Subcommittee
Open Session

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission 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.



Rebecca Silberman
Official Reporter
Neal R. Gross & Co., Inc.